

Project Manual

Bid No. 22-12

Town of Arlington

Dallin Elementary

HVAC RTU Replacement Project

Arlington, Massachusetts

AWARDING AUTHORITY
TOWN OF ARLINGTON

acting through and by its
TOWN MANAGER

Town Hall Annex
730 Massachusetts Ave.
Arlington, MA 02476

ARCHITECT
Trinidad Engineering, INC.
144 North Rd., Suite 2100
Sudbury, MA 01776

February 23, 2022

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**SECTION 000001
INVITATION FOR BID**

PART 1 - GENERAL

SEALED BIDS FOR CONSTRUCTION OF:

Dallin Elementary School
Rooftop Replacement Project
Arlington, MA.

IN ACCORDANCE WITH CONTRACT DOCUMENTS PREPARED BY:

Trinidad Engineering, Inc.
144 north road
Suite 2100
Sudbury ma 01776

HEREINAFTER CALLED THE ENGINEER, WILL BE RECEIVED BY:

Town of Arlington

ACTING BY AND THROUGH ITS

Town Manager: Mr. Adam Chappelaine
Hereinafter called the "Awards Authority", or "Owner" at:
Purchasing Department
Town Hall Annex
730 Massachusetts Ave.
Arlington, MA 02476
Attention: Purchasing Officer Mr. Domenic Lanzillotti

- A. Bidding procedures and award of the Contract shall be in accordance with the provisions of General Laws of the Commonwealth of Massachusetts Chapter 30, Section 39M; Chapter 149, Sections 44A through 44L; Chapter 193 of the Acts and Resolves of 2004, An Act Further Regulating Public Construction in the Commonwealth; and Chapter 507 of the Acts and Resolves of 2004, an Act Further Regulating Public Construction; including all current amendments.
- B. For this project, the HVAC Bidder shall act as the Prime Contractor. All Bidders must be certified by DCAM for the category of work and dollar amount of this Project. The Prime Contractor shall be DCAM certified in the category "Heating, Ventilating and Air Conditioning". Each Bidder must submit a copy of the Certificate of Eligibility from DCAM showing that it is eligible to bid on the Project. Each Bidder must also submit an Update Statement with its bid.
- C. Bids shall be received by the Awarding Authority at the address listed above, no later than 1. 10:00 AM, local legal time, March 10, 2022.
at which times and place they will be publicly opened and forthwith read aloud. Any bid received after the time and date specified will not be considered.
- D. A bid deposit in the amount of five percent (5%) of the Bid amount shall be submitted with each Bid. Bid deposit shall be in the form of certified check, Treasurer or Cashier's check issued by a responsible bank or trust company payable to Town of Arlington, or a bid bond (a) in a form satisfactory to the Awarding Authority, (b) with a surety company qualified to do business in the Commonwealth of Massachusetts, and (c) conditioned upon faithful performance by the principal of the agreements contained in the Bid. Return of bid deposits will be in accordance with the provisions of the applicable Massachusetts General Laws.

- E. The Awarding Authority will reject Bids when required to do so by the above-referenced General Laws. In addition, the Awarding Authority reserves the right to waive any informalities in bidding and to reject any and all Bids if it deems to be in the public interest to do so. Also, the Awarding Authority reserves the right to reject any bid if it determines that such bid does not represent the bid of a person or firm competent to perform the work as specified, or if less than three bids are received, or if bid prices are not acceptable without further competition.
- F. The successful Bidder will be required to furnish a Payment Bond and Performance Bond in the amount of 100% of the applicable maximum Contract Amount. The cost of such bonds shall be included in the bid price. Such bonds shall be of a surety company qualified to do business under the laws of the Commonwealth of Massachusetts and in a form satisfactory to the Awarding Authority.
- G. Wages and contributions to be paid employees on the Project shall not be less than those established by a schedule issued by the Commissioner of the Department of Labor and Workforce Development of the Commonwealth of Massachusetts, in accordance with MGL c.149, §§ 26 to 27H inclusive, a copy of which is included in the Contract Documents and shall be made a part of the Contract.
- H. Contract Documents including Specifications will be available for download on 02/16/22 at 12:00PM at:
Website: www.arlingtonma.gov/purchasing
- I. The Awarding Authority is exempt from sales and federal excise tax to the extent permitted under law; bidders should not include such taxes in figuring or in references to any bid.
- J. There will be a pre-bid conference held at the site on 185 Florence Ave, Arlington, MA 02476 on Wednesday, February 22nd at 2:00pm.
- K. Commonwealth of Massachusetts General Laws are incorporated herein by reference. Any inconsistency between the Invitation to Bid, Instructions to Bidders, Bid Forms, Conditions of the Contract, and any other Contract Documents and these statutes, or any other applicable statutes, bylaws, or regulations existing on the date on which the bids are to be received, shall not be grounds for invalidating the bidding procedures, but, where required by law, such statute, bylaw, or regulation shall be deemed to govern.
- L. By-Law of the Town of Arlington, Title 1, Article 16, Minority/Woman Workforce Participation in Construction Projects which exceeds \$200,000.00 is part and parcel of the bid.

TOWN OF ARLINGTON
acting through and by its
TOWN MANAGER

END OF SECTION

SECTION 000002
INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL

1.01 COMPLEMENTARY DOCUMENT

- A. INVITATION FOR BID, included herewith, is complementary to this document and shall be carefully reviewed by bidders for specific instructions which are not repeated herein.

1.02 STATUTES REGULATING COMPETITIVE BIDDING

- A. Bidding procedures and award of contract shall be in accordance with the provisions of Chapter 30, Section 39M and Chapter 149, Sections 44A through 44L of the General Laws of the Commonwealth of Massachusetts, including all current amendments.
- B. In the event of any discrepancy or inconsistency between the provisions of these Instructions to Bidders and Contract Documents and the above-mentioned statutes, the provisions of the above-mentioned statutes shall govern. In such event, the application of all remaining provisions not in conflict to any circumstance other than that in which the conflict occurs shall not be affected thereby.

1.03 BIDDER'S QUALIFICATIONS

- A. No individual or firm may submit a Bid unless it includes, in the Bid Form, a list of at least Three (3) references of similar projects completed in the last Five (5) years.
- B. The Awarding Authority will reject Bids when required to do so by the above-referenced General Laws. In addition, the Awarding Authority reserves the right to waive any informalities in bidding and to reject any and all Bids if it deems to be in the public interest to do so. Also, the Awarding Authority reserves the right to reject any bid if it determines that such bid does not represent the bid of a person or firm competent to perform the work as specified, or if less than three bids are received, or if bid prices are not acceptable without further competition.

1.04 INTERPRETATION OF DOCUMENTS: NOTIFICATION OF ERRORS

- A. Interpretation of the provisions of the Contract Documents will be made by the Architect upon written request of any bidder, provided that such request is received by the Architect at least seven (7) days prior to date of applicable bid opening, and that the Architect considers such interpretation to be of sufficient importance. Oral or telephone interpretations will not generally be made, and if made, shall be strictly informal and not legally valid or binding.
- B. Architect's interpretations shall be in the form of Addenda to the Contract Documents.
- C. Bidders are urged to communicate all errors or discrepancies found in the Contract Documents to the Architect. Telephone calls pointing out any such errors or discrepancies will be taken by the Architect, but only for the purpose of receiving the information in order that it may be properly processed, and not for interpretation or clarification.

1.05 EXAMINATION OF CONTRACT DOCUMENTS AND SITE

- A. Each Bidder shall carefully examine the Contract Documents to obtain a thorough understanding of the work of his bid in addition to work of related trades. In addition, each Bidder shall personally visit the site to become thoroughly acquainted with the conditions as they exist thereon.
- B. Failure of any Bidder to thoroughly examine the Contract Documents, or to visit and examine the site shall in no way relieve the bidder of any obligation with respect to his/her bid or of any responsibility assigned the bidder under the Contract.

1.06 PRE-BID SITE VISIT**1.07 PRE-BID SITE VISIT WILL BE HELD ON MARCH 1, 2022 AT 2:00PM.****1.08 MODIFICATION AND WITHDRAWAL OF BIDS**

- A. Modifications of Bids will be permitted after submission of such bids provided clearly written, readily understandable instructions for same are received by the Awarding Authority in writing prior to time established for opening of such bids.
- B. No Bid may be withdrawn for a period of 30 days, excluding Saturdays, Sundays and legal holidays, after actual date of the Bid opening.

1.09 ADDENDA

- A. Architect's interpretations shall be in the form of Addenda to the Contract Documents. Addenda will be posted electronically to Town of Arlington Website. Failure to receive such Addenda shall in no way relieve any bidder from the execution of its provisions. All bidders are cautioned to verify the number of Addenda that have been issued and to secure any needed copies from the Architect before submitting a bid.
- B. Bidders shall acknowledge each and every Addendum in the spaces provided on the Bid Form. Failure of a bidder to acknowledge each and every Addendum in the space provided on the Bid Form may cause rejection of the bid.

1.10 BID FORM

- A. The Awarding Authority will make available to every person applying therefore, a Form for General Bid. Each bona fide General Bidder will be furnished forms for his/her proposal upon request. Such forms will be made available at the Architect's office during the regular office hours throughout the bidding period. Bids must be submitted on the forms provided by Architect or on forms included in the bid documents of the Project Manual.
- B. All blank spaces provided on the bid forms shall be filled in with ink or typewritten. Where space is provided, sums shall be expressed in both words and figures. In case of discrepancy between the two, the written words shall govern.
- C. No interlineations, additions, alterations, or erasures shall be made on the forms.
- D. The Awarding Authority is exempt from sales and federal excise tax to the extent permitted under law; bidders should not include such taxes in figuring or in references to any bid.

1.11 ALTERNATES

- A. Refer to Section 01 23 00 for additional information in reference to Alternates.

1.12 SUBMISSION OF BIDS

- A. The Bid Form shall be properly executed and enclosed with Bid Deposit (equal to 5% of the value of the total bid) in a sealed envelope. Sealed envelope shall be plainly marked on the outside with the following information:

Dallin Elementary School
Rooftop Replacement Project
Arlington, MA.

(Name of Bidder)

(Address of Bidder)

- B. If Bid is mailed, the above-required envelope shall be enclosed in a second envelope identified with the above markings and mailed to the place of bid opening, as stipulated in the Invitation for Bid. Mailed Bids must be received before time scheduled for opening of bids.
- C. A bid deposit in the amount of five percent (5%) of the Bid amount shall be submitted with each Bid. Bid deposit shall be in the form of certified check, Treasurer or Cashier's check issued by a responsible bank or trust company payable to Town of Arlington, or a bid bond (a) in a form satisfactory to the Awarding Authority, (b) with a surety company qualified to do business in the

Commonwealth of Massachusetts, and (c) conditioned upon faithful performance by the principal of the agreements contained in the Bid. Return of bid deposits will be in accordance with the provisions of the applicable Massachusetts General Laws.

1.13 PAYMENT AND PERFORMANCE BONDS

- A. The Payment and Performance Bonds required of the Contractor shall be in the amount of 100% of the Contract Sum from a surety company qualified to do business under the laws of the Commonwealth of Massachusetts and in a form satisfactory to the Awarding Authority.

1.14 FOREIGN CORPORATIONS

- A. The attention of bidders is called to the General Laws, Chapter 30, Section 39L, as amended by The Acts of 1967, Chapter 3, under which the Awarding Authority may not enter into a contract with a foreign corporation (a corporation not organized under the Laws of Massachusetts), nor approve a foreign corporation as a contractor, unless the foreign corporation has filed with the Awarding Authority a certificate by the State Secretary stating that the foreign corporation has complied with General Laws, Chapter 181, Sections 3 and 5, and stating the date of such compliance.

1.15 AWARD OF CONTRACT

- A. The Contract will be awarded to the lowest responsible, competent and eligible bidder in accordance with Chapter 149, Sections 44A through 44J of the Massachusetts General Laws.
- B. The Awarding Authority reserves the right to reject general bids in accordance with the provisions of Massachusetts General Laws, Chapter 149, §§44A-44J.
- C. In addition, the Awarding Authority may consider informal and may reject any bid which is not prepared and submitted in accordance with all requirements of the bid documents, or which contains erasures, alterations, additions, errors or irregularities of any kind, or which contains proposed prices for any class or item of work which are, in the judgment of the Awarding Authority, substantially less or more than the actual cost to complete the work; provided, however, that the Awarding Authority reserves the right to waive any and all informalities as to form. Matters as to substance shall not be waived. Subject to the provisions of applicable laws, if the bid forms, specifications, or any other bid documents require submission of special information or data to accompany bids for any trade, if applicable, and any bidder neglects to furnish such information or data with its bid, the Awarding Authority may reject the bid of such bidder as incomplete; provided, however, that the Awarding Authority reserves the right to deem any such omission as an informality for which such bid will not be rejected, and to subsequently receive such information or data prior to award of the contract. See Section 3.00 above as to the Awarding Authority's right to reject the bid of any bidder who is not qualified, competent and responsible.

1.16 COMMENCEMENT AND COMPLETION OF WORK

- A. The successful bidder, upon execution of the Contract Agreement, which may constitute as Notice to Proceed unless specifically indicated by Awarding Authority otherwise, shall commence the work of the Contract within seven (7) calendar days. Thereafter the Contractor shall diligently and continuously carry on the work in such manner as to substantially complete the work as stipulated in "Town of Arlington General Contract".

1.17 LIQUIDATED DAMAGES

- A. Liquidated damages for not completing the work within the time limit specified above will be assessed by the Owner. Liquidated damages will be in the amount as stipulated in "Town of Arlington General Contract". The liquidated damages amount per calendar day is a minimum damage figure to compensate the Owner for administrative costs and loss or delay of its use of the project, and for added Owner's Project Manager, Architect and consultant fees, and does not limit in any way the liability of the Contractor for damages in excess of the specified liquidated damages amount for other damages, in particular, damages for breach of Contract. It is expressly understood that such liquidated damages do not constitute a penalty.

END OF DOCUMENT

END OF SECTION

**DALLIN ELEMENTARY SCHOOL
HVAC RTU REPLACEMENT PROJECT
ARLINGTON, MA**

BID FORM

TO THE AWARDING AUTHORITY:

- A. The undersigned proposes to furnish all labor and materials required for the construction of

**Dallin Elementary School
HVAC RTU REPLACEMENT PROJECT
Arlington, MA**

in accordance with accompanying Plans and Specifications prepared by the Architect

**Trinidad Engineering, Inc.
144 North Rd., Suite 2100
Sudbury, MA 01776**

for the Contract Price specified below, subject to additions and deductions according to the terms of the Specifications.

- B. This Bid includes Addenda numbered: _____.

- C. The proposed Contract Price is:

(\$_____).

For Alternate No. 1 Add \$_____

- D. The undersigned offers the following information as evidence of his qualifications to perform the work as bid upon according to all the requirements of the Contract Documents:

1. Have been in business under present business name for _____ years.
2. Ever failed to complete any work awarded? _____.
3. List **three** (3) separate Owner references for projects completed in the past **five** (5) years on which you served as contractor for work of similar character as required for this project:

<u>Project</u>	<u>Owner Ref. Name</u>	<u>Telephone No.</u>	<u>Amount of Contract</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

4. Bank Reference: _____.

- E. The undersigned hereby certifies, under the pains and penalties of perjury, that he has carefully examined the Contract Documents, established a thorough understanding of the existing conditions, and has obtained sufficient information for executing the work of his bid and the work of all related trades.

**DALLIN ELEMENTARY SCHOOL
HVAC RTU REPLACEMENT PROJECT
ARLINGTON, MA**

- F. The undersigned agrees that, if selected as Contractor, he will within five (5) days, Saturdays, Sundays, and legal holidays excluded, after presentation thereof by the Awarding Authority, execute the Contract in accordance with the terms of this bid and furnish a labor and materials payment bond and performance bond, of a surety company qualified to do business under the laws of the Commonwealth and satisfactory to the Awarding Authority, and in the amount no less than **100%** of the Contract Price, the premiums for which is to be paid by the Contractor and is included in the Contract Price.
- G. The undersigned hereby certifies that he is able to furnish labor that can work in harmony with Owner's separate contractor(s) and all other elements of labor employed or to be employed on the work and that he/she will comply fully with all laws and regulations applicable to awards made subject to MGL c.149, § 44A.
- H. The undersigned bidder hereby certifies, under the pains and penalties of perjury, the foregoing bid is based upon the payment to laborers to be employed on the project of wages in an amount no less than the applicable prevailing wage rates established for the project by the Massachusetts Department of Labor and Workforce Development. The undersigned bidder agrees to indemnify the awarding authority for, from and against any loss, expense, damages, actions or claims, including any expense incurred in connection with any delay or stoppage of the project work, arising out of or as a result if (1) the failure of the said bid to be based upon the payment of the said applicable prevailing wages rates or (2) the failure of the bidder, if selected as the contractor, to pay laborers employed on the project the said applicable prevailing wage rates.
- I. The undersigned hereby certifies that all employees to be employed at the worksite shall have successfully completed a course in construction safety and health approved by the **OSHA** that at least **10 hours** in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee.
- J. **The undersigned further certifies under the penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person.** As used in this subsection the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity.
- K. The undersigned further certifies under penalties of perjury that the said undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of Section 29F of Chapter 29, or any other applicable debarment provisions of any chapter of the General Laws or any rule or regulation promulgated thereunder.

Date: _____
(Name of General Bidder)

Signed: _____

(Seal) By: _____
(Print Name and Title of Person Signing Bid)

(Business Address)

(City and State)

(Business Telephone Number)

SECTION 00004
TOWN OF ARLINGTON - GENERAL CONTRACT

THE TOWN OF ARLINGTON, a municipal corporation of the Commonwealth of Massachusetts, acting through its Town Manager, and

(The Contractor)

hereby mutually agree as follows:

ARTICLE I - THE CONTRACT DOCUMENTS

The Contract Documents, as defined in the CONSOLIDATED GENERAL CONDITIONS, including said CONSOLIDATED GENERAL CONDITIONS are hereby incorporated by reference and made a part hereof, and shall include Addenda and Alternates, if any.

ARTICLE II - GENERAL DESCRIPTION OF THE WORK

The Contractor shall furnish all of the materials and perform all of the Work required by the Contract Documents titled Dallin Elementary School Roof Top Replacement Project dated **February 23, 2022** prepared by Trinidad Engineering, Inc, 144 North Road, Suite 2100, Sudbury MA 01776, acting as, and in these Contract Documents entitled, the Engineer.

ARTICLE III – COMMENCEMENT AND COMPLETION OF WORK AND LIQUIDATED DAMAGES

It is agreed that time is of the essence of this Contract.

The Awarding Authority will reject Bids when required to do so by the above-referenced General Laws. In addition, the Awarding Authority reserves the right to waive any informalities in bidding and to reject any and all Bids if it deems to be in the public interest to do so. Also, the Awarding Authority reserves the right to reject any bid if it determines that such bid does not represent the bid of a person or firm competent to perform the work as specified, or if less than three bids are received, or if bid prices are not acceptable without further competition.

INTERPRETATION OF DOCUMENTS: NOTIFICATION OF ERRORS

It is agreed that time is of the essence of this Contract.

Architect's interpretations shall be in the form of Addenda to the Contract Documents. The Contractor shall commence work only upon the execution of this Contract by the Town of Arlington by its Town Manager, the certification of the availability of the appropriation by the Town Comptroller, approval as to form by the Town Counsel, and upon Issuance of a Notice to Proceed, and shall bring the Work to Substantial Completion by August 6, 2021 , and to Final Completion within 45 calendar days thereafter. Liquidated damages in the amount of \$ 500 per calendar day will be applicable after the date of Substantial Completion for which the project is not substantially complete, and for each day after the date of Final Completion for which the project is not finally complete, and otherwise in accordance with the provisions of the CONSOLIDATED GENERAL CONDITIONS. The liquidated damages amount per calendar day is a minimum damage figure to compensate the Owner for administrative costs and loss or delay of its use of the building and site and does not limit in any way the liability of the Contractor for damages in excess of the specified liquidated damages amount for other damages, for example, damages for breach of Contract, and added architect and consultant fees. It is expressly understood that such liquidated damages do not constitute a penalty. All work shall be phased (if applicable) in accordance with the Contract Documents.

NOTE: NOTWITHSTANDING ANYTHING TO THE CONTRARY, THE TIME OF COMMENCEMENT SHALL ONLY BE BY WRITTEN NOTICE TO PROCEED WITH THE WORK AS DATED AND ISSUED TO THE CONTRACTOR BY THE TOWN OF ARLINGTON. NOTICE TO PROCEED MAY BE GIVEN ANYTIME AFTER THE AWARD OF THE

CONTRACT, BUT NOT LATER THAN 14 DAYS AFTER THE EXECUTION OF THE CONTRACT.

ARTICLE IV – COMPENSATION TO BE PAID BY TOWN

The Town shall pay and the Contractor shall accept, as full compensation for everything furnished, done by or resulting to the Contractor in carrying out this Contract, subject to additions and deductions in the Contract Documents in the sum of:

(\$)

ARTICLE V – AVAILABILITY OF APPROPRIATION

This Contract is subject to an appropriation being available therefor.

This Contract is executed by the Town of Arlington and by the Contractor as of this _____ day of _____, 2022.

TOWN OF ARLINGTON

Signed: _____

Town Manager

TOWN OF ARLINGTON

Approved as to Availability

Of Appropriation

CONTRACTOR:

Signed: _____

Town Comptroller

By: _____

(Name)

Approved as to Form: _____

(Title)

Town Counsel

(Address)

(Affix Corporate Seal Here)

END OF DOCUMENT

END OF SECTION

**SECTION 000005
PAYMENT BOND**

BOND NO. _____

KNOW ALL MEN BY THESE PRESENT, that we _____ with a place of business at _____ as principal (the "Principal"), and _____, a corporation qualified to do business in the Commonwealth of Massachusetts, with a place of business at _____ as Surety (the "Surety"), are held and firmly bound unto TOWN OF ARLINGTON as Obligee (the "Obligee"), in the sum of

lawful money of the United States of America, to be paid to the Obligee, for which payment, well and truly to be made, we bind ourselves, our respective heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these present.

WHEREAS, the Principal has assumed and made a contract with the Obligee, bearing the date of _____, for the construction of _____.

NOW, THE CONDITIONS of this obligation are such that if the Principal and all subcontractors under said contract shall pay for all labor performed or furnished and for all materials used or employed in said contract and in any and all duly authorized modifications, alterations, extensions of time, changes or additions to said contract that may hereafter be made, notice to the Surety of such modifications, alterations, extensions of time, changes or additions being hereby waived, the foregoing to include any other purposes or items set out in, and to be subject to, the provisions of Massachusetts General Laws, Chapter 30, Section 39A, and Chapter 149, Section 29, as amended then this obligation shall become null and void; otherwise, it shall remain in full force and virtue.

IN WITNESS WHEREFORE, the Principal and Surety have hereto set their hands and seals this _____ day of _____, 2022.

PRINCIPAL

[Name and Seal]

[Title]

Attest: _____

The rate for this bond is _____ % of the first \$ _____ and _____ % for the next \$ _____.

The total premium for this Bond is \$ _____.

SURETY

[Attorney-In-Fact] [Seal]

[Address]

[Phone]

Attest: _____

END OF PAYMENT BOND SECTION

**SECTION 000007
STATEMENT OF COMPLIANCE**

WEEKLY PAYROLL RECORDS REPORT & STATEMENT OF COMPLIANCE

In accordance with Massachusetts General Law c. 149, §27B, a true and accurate record must be kept of all persons employed on the public works project for which the enclosed rates have been provided. A Payroll Form has been printed on the reverse of this page and includes all the information required to be kept by law. Every contractor or subcontractor is required to keep these records and preserve them for a period of three years from the date of completion of the contract.

In addition, every contractor and subcontractor is required to submit a copy of their weekly payroll records to the awarding authority. This is required to be done on a weekly basis. Once collected, the awarding authority is also required to preserve those records for three years from the date of completion of the project.

Each such contractor or subcontractor shall furnish to the awarding authority directly within 15 days after completion of its portion of the work, a statement, executed by the contractor, subcontractor or by any authorized officer thereof who supervised the payment of wages, this form.

STATEMENT OF COMPLIANCE

, 2022

(Name of signatory party) (Title)

do hereby state:

That I pay or supervise the payment of the persons employed by

on the

(Contractor, subcontractor or public body) (Building or project)
and that all mechanics and apprentices, teamsters, chauffeurs and laborers employed on said project have been paid in accordance with wages determined under the provisions of sections twenty-six and twenty-seven of chapter one hundred and forty nine of the General Laws.

Signature _____ **Title** _____

09/11

END OF SECTION

SECTION 000008
MASSACHUSETTS WEEKLY PAYROLL REPORT



MASSACHUSETTS WEEKLY CERTIFIED PAYROLL REPORT FORM

Company's Name:			Address:		Phone No.:			Payroll No.:																					
Employer's Signature:			Title:		Contract No.:		Tax Payer ID No.:		Work Week Ending:																				
Awarding Authority's Name:			Public Works Project Name:		Public Works Project Location:			Min. Wage Rate Sheet No.:																					
General / Prime Contractor's Name:			Subcontractor's Name:					"Employer" Hourly Fringe Benefit Contributions																					
Employee Name & Complete Address	Employee is OSHA 10 Certified (?)	Work Classification:	Appr. Rate (%)	Worked					Hours	Project Hours (A)	Hourly Base Wage (B)	Health & Welfare Insurance (C')	ERISA Pension Plan (D)	Supp. Unemp. (E)	Total Hourly Prev. Wage (F)	(A x F)	(B+C+D+E)	Project Gross Wages (G)	Total Gross Wages	Check No. (H)									
				Su.	Mo.	Tu.	We.	Th.	Fr.	Sa.											All Other Hours								

NOTE: Pursuant to MGL Ch. 149 s.27B, every contractor and subcontractor is required to submit a "true and accurate" copy of their weekly payroll records directly to the awarding authority. Failure to comply may result in the commencement of a criminal action or the issuance of a civil citation.

Page _____ of _____

Date received by awarding authority

/ /

SECTION 000009
THE MASSACHUSETTS PREVAILING WAGE LAW
M.G.L. C. 149, §§26-27
NOTICE TO AWARDING AUTHORITIES

- A. The enclosed wage schedule applies only to the specific project listed at the top of the schedule, and these rates will remain in effect for the duration of the project, except in the case of multi-year projects. For projects lasting longer than one year, awarding authorities must request updated rates.
- B. You should request an updated wage schedule from the Department of Labor Standards if you have not opened bids or selected a contractor within 90 days of the date of issuance of the enclosed wage schedule.
- C. The wage schedule shall be incorporated in any advertisement or call for bids for the project for which it has been issued.
- D. Once a contractor has been selected by the awarding authority, the wage schedule shall be made a part of the contract for that project.

NOTICE TO CONTRACTORS

- E. The enclosed wage schedule must be posted in a conspicuous place at the work site during the life of the project.
- F. The wages listed on the enclosed wage schedule must be paid to employees on public works projects regardless of whether they are employed by the prime contractor, a filed sub-bidder, or any sub-contractor.
- G. The enclosed wage schedule applies to all phases of the project, including the final clean-up. Contractors whose only role is to perform final clean-up must pay their employees according to this wage schedule.
- H. All apprentices must be registered with the Massachusetts Division of Apprenticeship Standards (DAS) in order to be paid at the lower apprentice rates. All apprentices must keep his/her apprentice identification card on his/her person during all work hours. If a worker is not registered with DAS, they must be paid the "total rate" listed on the wage schedule regardless of experience or skill level. For further information, please call 617-626-5409, or write to:

DAS
19 Staniford Street, 1 st Floor
P.O. Box 146759,
Boston, MA 02114.

END OF SECTION



TOWN OF ARLINGTON DEPARTMENT OF HUMAN RESOURCES

730 MASSACHUSETTS AVENUE, ARLINGTON, MA 02476
PHONE (781) 316-3120 FAX: (781) 316-3129

CARYN COVE MALLOY
DIRECTOR OF HUMAN RESOURCES

CORI REQUEST FORM

Arlington Licensing Board has been certified by the Criminal History Systems Board for access to conviction and pending criminal case data. As an applicant/employee for the position of _____, I understand that a criminal record check will be conducted for conviction and pending criminal case information only and that it will not necessarily disqualify me. The information below is correct to the best of my knowledge.

Applicant/Employee Signature

Applicant/Employee Information – Please Print

*Name: _____
*Last _____ First _____ MI _____ Suffix _____

*Date of Birth: _____ *Last 6 of Social Security #: _____

Sex: _____ Race: _____

Father's Name: _____
Last _____ First _____

Mother's Name: _____
Last _____ First _____ Maiden _____

THE ABOVE INFORMATION WAS VERIFIED BY REVIEWING THE FOLLOWING FORMS OF
GOVERNMENT ISSUED PHOTOGRAPHIC IDENTIFICATION: _____.

* Indicates a required field

**SECTION 012300
ALTERNATES**

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Carefully review and examine all other Contract Documents for requirements therein affecting the work of this Section. Furthermore, coordinate and sequence the work of this Section with all other trades affected.

1.02 SUMMARY

- A. This Section includes administrative and procedural requirements for alternates.
 - 1. The descriptions of alternates listed herein below and through the Contract Documents are intended to set the intent and to describe the major scope of work only. Such descriptions are not to be taken as limiting the work required under any of the alternates, and all associated work of all trades required to carry out the intent of each of the accepted alternates shall be performed without cost additional to that agreed upon as the alternate price(s).

1.03 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.04 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Where necessary, include a complete description of negotiated modifications to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

1.05 SELECTION AND AWARD OF ALTERNATES

- A. Indicate variation of Bid Price for each alternate described below and list where provided for on the Bid Form or any supplement to it, which requests a difference in Contract Price by adding to or subtracting from the base bid price.
- B. Every alternate contained in the Contract Documents are listed in a numerical sequence in order of priority. When the Awarding Authority decides to consider alternates in determining the lowest eligible and responsible bidder, the Awarding Authority will consider the alternates in descending numerical sequence, such that no single alternate shall be considered unless every

alternate preceding it on the list has been added to or subtracted from the base bid price in accordance with MGL c.149, s.44G.

- C. The lowest responsible and eligible bid will be determined on the basis of the base bid, adjusted by such alternate(s) as may be included in the award of the Contract in the sole discretion of the Awarding Authority.

PART 2 – PRODUCTS

2.01 [NOT USED]

PART 3 - EXECUTION

3.01 SCHEDULE OF ALTERNATES

- A. The description of alternate(s) listed herein below and through the Contract Documents are intended to set the intent and to describe the major scope of work only. Such descriptions are not to be taken as limiting the work required under any of the alternates, and all associated work of all trades required to carry out the intent of each of the accepted alternates shall be performed without cost additional to that agreed upon as the alternate price.
 - 1. Alternate No. 1: State the amount to be added to the proposed Contract Sum for the work described as follows:
 - a. Mechanical Contractor shall remove and replace AH-1 & AH-2 per the mechanical specification section.

END OF SECTION

1.2 EXECUTION, CORRELATION AND INTENT

1.2.1 The Contract Documents shall be signed by the Owner and Contractor as provided in the Agreement. A copy of the signed set shall be deposited with the Architect. If either the Owner or Contractor or both do not sign all the Contract Documents, the Architect shall identify such unsigned Documents upon request.

1.2.2 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents. By executing the Contract, the Contractor also certifies, under penalties of perjury, that to the best of his information, knowledge and belief he has complied with all laws of the Commonwealth of Massachusetts relating to taxes.

1.2.3 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the intended results. All Work mentioned or indicated in the Contract Documents shall be performed by the Contractor as part of this Contract unless it is specifically indicated in the Contract Documents that such Work is to be done by others.

1.2.4 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

1.2.5 Unless otherwise stated in the Contract Documents, words which have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

1.2.6 Where codes, standards, requirements and publications of public and private bodies are referred to in the Specifications, references shall be understood to be to the latest revisions prior to the date of receiving bids, except where otherwise indicated.

1.2.7 Where no explicit quality or standards for materials or workmanship are established for Work, such Work or materials is to be of good, workmanlike quality for the intended use and consistent with the quality of the surrounding Work and of the construction of the Project generally.

1.2.8 All manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with the manufacturer's written or printed directions and instructions unless otherwise indicated in the Contract Documents.

1.2.9 The Mechanical, Electrical and Fire Protection Drawings are diagrammatic only, and are not intended to show the alignment, physical locations or configurations of such Work.

Such Work shall be installed without additional cost to the Owner to clear all obstructions, permit proper clearances for the Work of other trades, and present an orderly appearance where exposed. Prior to beginning such Work, the Contractor shall prepare coordination drawings showing the exact alignment, physical location and configuration of the Mechanical, Electrical and Fire Protection installations and demonstrating to the Contractor's satisfaction that the installations will comply with the preceding sentence.

1.2.10 Exact locations of fixtures and outlets shall be obtained from the Architect as provided in Subparagraph 3.2.5 before the Work is roughed in; Work installed without such information from the Architect shall be relocated at the Contractor's expense.

1.2.11 Test boring or soil test information included with the Contract Documents or otherwise made available to the Contractor was obtained by the Owner for use by the Architect in the design of the Project or Work. The Owner does not hold out such information to the Contractor as an accurate or approximate indication of subsurface conditions, and no claim for extra cost or extension of time resulting from a reliance by the Contractor on such information shall be allowed except as provided in Subparagraph 4.3.6.

1.3 OWNERSHIP AND USE OF ARCHITECT'S DRAWINGS, SPECIFICATIONS AND OTHER DOCUMENTS

1.3.1 The Drawings, Specifications and other documents prepared by the Architect are instruments of the Architect's service through which the Work to be executed by the Contractor is described. The Contractor may retain one contract record set. Neither the Contractor nor any Subcontractor, Sub-subcontractor or material or equipment supplier shall own or claim a copyright in the Drawings, Specifications and other documents prepared by the Architect, and unless otherwise indicated, and except as provided in the Owner/Architect Agreement for the Project, the Architect shall be deemed the author of them and will retain all common law, statutory and other reserved rights, in addition to the copyright. All copies of them, except the Contractor's record set, shall be returned or suitably accounted for to the Architect, on request, upon completion of the Work. The Drawings, Specifications and other documents prepared by the Architect, and copies thereof furnished to the Contractor, are for use solely with respect to this Project. They are not to be used by the Contractor or any Subcontractor, Sub-subcontractor or material or equipment supplier on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner and Architect. The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are granted a limited license to use and reproduce applicable portions of the Drawings, Specifications and other documents prepared by the Architect appropriate to and for use in the execution of their Work under the Contract Documents. All copies made under this license shall bear the statutory copyright notice, if any, shown on the Drawings, Specifications and other documents prepared by the Architect. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's copyright or other reserved rights.

Notwithstanding anything herein to the contrary, as between the Owner and Architect, their rights and obligations with respect to the Architect's instruments of service are governed by the provisions of the Owner/Architect Agreement for the Project.

1.4 CAPITALIZATION

1.4.1 Terms capitalized in these General Conditions include those which are (1) specifically defined, (2) the titles of numbered articles and identified references to Paragraphs, Subparagraphs and Clauses in a document or (3) the titles of documents published by the American Institute of Architects.

1.5 INTERPRETATION

1.5.1 In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

ARTICLE 2

OWNER

2.1 DEFINITIONS

2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. From time to time herein the Owner is referred to as the Town.

2.1.2 The Project Manager is the person or entity identified as such in writing by the Owner, at the Owner's option. The Project Manager shall act as the Owner's representative with respect to all matters pertaining to the Project. The duties, responsibilities, and obligations of the Project Manager under this Contract may be modified from time to time by the Town, so long as such modifications do not interfere materially with the Contractor's performance of the Work hereunder, and so long as the Contractor is given notice of any such modifications that affect the Contractor's performance of the Work.

2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

2.2.1 The Owner upon reasonable written request shall furnish to the Contractor in writing information which is necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein at the time of execution of the Agreement.

2.2.2 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site.

2.2.3 Except for permits and fees which are the responsibility of the Contractor under the Contract Documents, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures, or for permanent changes in existing facilities.

2.2.4 Information or services required of the Owner hereunder shall be furnished by the Owner with reasonable promptness after receipt from the Contractor of a written request for such information or services.

2.2.5 Unless otherwise provided in the Contract Documents, the Contractor will be furnished, free of charge, such copies of Drawings and Project Manuals as are reasonably necessary for execution of the Work.

2.2.6 The foregoing are in addition to other duties and responsibilities of the Owner enumerated herein and especially those in respect to Article 6 (Construction by Owner or by Separate Contractors), Article 9 (Payments and Completion) and Article 11 (Insurance and Bonds).

2.3 OWNER'S RIGHT TO STOP THE WORK

2.3.1 If the Contractor fails to correct Work which is not in accordance with the requirements of the Contract Documents as required by Paragraph 12.2 or persistently fails to carry out Work in accordance with the Contract Documents, the Owner, by written order signed by the Project Manager, may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity.

2.3.2 The Owner may order the Contractor in writing to suspend, delay, or interrupt all or any part of the Work for such period of time as it may determine to be appropriate for the convenience of the Owner; provided however, that if there is a suspension, delay or interruption ordered by the Owner for fifteen days or more or due to a failure of the Owner to act within the time specified in this Contract, the Owner shall make an adjustment in the Contract Sum for any increase in the cost of performance of this Contract, but shall not include any profit to the Contractor on such increase; and provided further, that the Owner shall not make any adjustment in the Contract Sum under this provision for any suspension, delay, interruption or failure to act to the extent that such is due to any cause for which this Contract provides for an equitable adjustment of the Contract Sum under any other contract provisions.

2.3.3 The Contractor must submit the amount of a claim under Subparagraph 2.3.2 to the Owner in writing as soon as practicable after the end of the suspension, delay, interruption or failure to act and, in any event, not later than 21 days after the end thereof. Except for costs due to a suspension order, the Owner shall not approve any costs in the claim incurred more than twenty days before the Contractor notified the Owner in writing of the act or failure to act involved in the claim.

2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

2.4.1 If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a seven-day period after receipt of written notice from the Owner to begin and prosecute correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Construction Change Directive shall be issued deducting from payments then or thereafter due the Contractor the cost of correcting such deficiencies, including compensation for the Architect's additional services and expenses made necessary by such default, neglect or failure. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

ARTICLE 3

CONTRACTOR

3.1 DEFINITION

3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The term "Contractor" means the Contractor or the Contractor's authorized representative.

3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

3.2.1 Before starting the Work, and at frequent intervals during the progress thereof, the Contractor shall carefully study and compare the Contract Documents with each other and with any information furnished by the Owner pursuant to Subparagraph 2.2.2 and shall at once report to the Architect any error, inconsistency or omission the Contractor may discover. Any necessary change shall be ordered as provided in Article 7, subject to the requirements of Paragraph 1.2 and other provisions of the Contract Documents. If the Contractor proceeds with the Work without such notice to the Architect, having discovered such errors, inconsistencies or omissions, or if by reasonable study of the Contract Documents the Contractor could have discovered such, the Contractor shall bear all costs arising therefrom.

3.2.2 The Contractor shall take field measurements and verify field conditions and shall carefully compare such field measurements and conditions and other information known to the Contractor with the Contract Documents before commencing activities. Errors, inconsistencies or omissions discovered shall be reported to the Architect at once. Any necessary change shall be ordered as provided in Article 7, subject to the requirements of Paragraph 1.2 and other provisions of the Contract Documents. If the Contractor proceeds with the Work without such notice to the Architect, having discovered such errors, inconsistencies or omissions, the Contractor shall bear all costs arising therefrom.

3.2.3 The Contractor shall perform the Work in accordance with the Contract Documents and any submittals made in accordance with Paragraph 3.12.

3.2.4 The Contractor shall give the Architect timely notice of any additional Drawings, Specifications, or instructions required to define the Work in greater detail, or to permit the proper progress of the Work.

3.2.5 The Contractor shall not proceed with any Work not clearly and consistently defined in detail in the Contract Documents, but shall request additional drawings or instructions from the Architect as provided in Subparagraph 3.2.4. If the Contractor proceeds with such Work without obtaining further Drawings, Specifications or instructions, the Contractor shall correct Work incorrectly done at the Contractor's own expense.

3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract. Where the Contract Documents refer to particular construction means, methods, techniques, sequences or procedures or indicate or imply that such are to be used in the Work, such mention is intended only to indicate that the operations of the Contractor shall be such as to produce at least the quality of work implied by the operations described, but the actual determination of whether or not the described operations may be safely and suitably employed on the Work shall be the responsibility of the Contractor, who shall notify the Architect in writing of the actual means, methods, techniques, sequences or procedures which will be employed on the Work, if these differ from those mentioned in the Contract Documents. All loss, damage, liability, or cost of correcting defective work arising from the employment of any construction means, methods, techniques, sequences or procedures shall be borne by the Contractor, notwithstanding that such construction means, methods, techniques, sequences or procedures are referred to, indicated or implied by the Contract Documents, unless the Contractor has given timely notice to the Owner and Architect in writing that such means, methods, techniques, sequences or procedures are not safe or suitable, and the Owner has then instructed the Contractor in writing to proceed at the Owner's risk.

3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons performing portions of the Work under a contract with the Contractor.

3.3.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons other than the Contractor.

3.3.4 The Contractor shall be responsible for inspection of portions of Work already performed under this Contract to determine that such portions are in proper condition to receive subsequent Work.

3.4 LABOR AND MATERIALS

3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work. The word "provide" shall mean furnish and install completely, including connections, unless otherwise specified.

3.4.2 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Contract. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.

3.5 WARRANTY

3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless otherwise required or permitted by the Contract Documents, that the Work will be free from defects not inherent in the quality required or permitted, and that the Work will conform with the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The Contractor's warranty excludes remedy for damage or defect occurring after Substantial Completion and caused by abuse, modifications not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear under normal usage.

3.5.2 The Contractor shall be responsible for determining that all materials furnished for the Work meet all requirements of the Contract Documents. The Architect may require the Contractor to produce reasonable evidence that a material meets such requirements, such as certified reports of past tests by qualified testing laboratories, reports of studies by qualified experts, or other evidence which, in the opinion of the Architect, would lead to a reasonable certainty that any material used, or proposed to be used in the Work, meets the requirements of the Contract Documents. All such data shall be furnished at the Contractor's expense. This provision shall not require the Contractor to pay for periodic testing of different batches of the same material, unless such testing is specifically required by the Contract Documents to be performed at the Contractor's expense.

3.5.3 If the Contractor proposes to use a material which, while suitable for the intended use, deviates in any way from the detailed requirements of the Contract Documents, the Contractor shall inform the Architect in writing of the nature of such deviations at the time the material is submitted for approval, and shall request written approval of the deviation from the requirements of the Contract Documents, in accordance with the procedures set forth in Mass. Gen. Laws Chapter 30, Section 39I.

3.5.4 In requesting approval of deviations or substitutions, the Contractor shall provide, upon request, evidence leading to a reasonable certainty that the proposed substitution or

deviation meets or exceeds the requirements set forth in Mass. Gen. Laws Chapter 30, Section 39M(b). If, in the opinion of the Architect, the evidence presented by the Contractor does not provide a sufficient basis for such reasonable certainty, the Architect may reject such substitution or deviation.

3.5.5 The Contract Documents are intended to produce a building of consistent character and quality of design. All components of the building including visible items of mechanical and electrical equipment have been selected to have a coordinated design in relation to the overall appearance of the building. The Architect shall judge the design and appearance of proposed substitutes on the basis of their suitability in relation to the overall design of the Project, as well as for their intrinsic merits. The Architect will not approve as equal to materials specified proposed substitutes which, in the Architect's opinion, would be out of character, obtrusive, or otherwise inconsistent with the character or quality of design of the Project. In order to permit coordinated design of color and finishes the Contractor shall, if required by the Architect, furnish the substituted material in any color, finish, texture, or pattern which would have been available from the manufacturer originally specified, at no additional cost to the Owner.

3.5.6 Any additional cost, or any loss or damage arising from the substitution of any material or any method for those originally specified shall be borne by the Contractor, notwithstanding approval or acceptance of such substitution by the Owner or the Architect, unless such substitution was made at the written request or direction of the Owner or the Architect.

3.5.7 The warranty provided in this paragraph 3.5 shall be in addition to and not in limitation of any other warranty required by the Contract Documents or otherwise prescribed by law.

3.5.8 The Contractor shall procure and deliver to the Architect, no later than the date claimed by the Contractor as the date of Substantial Completion, all special warranties required by the Contract Documents. Delivery by the Contractor shall constitute the Contractor's guarantee to the Owner that the warranties shall be performed in accordance with their terms and conditions.

3.6 TAXES

3.6.1 The Contractor shall pay sales, consumer, use and similar taxes for the Work or portions thereof provided by the Contractor which are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

3.7 PERMITS, FEES AND NOTICES

3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit and other permits and governmental fees, licenses and inspections necessary for proper execution and completion of the Work which are customarily secured after execution of the Contract and which are legally required when bids are received or

negotiations concluded. Notwithstanding the foregoing, the Town hereby waives the fee for the Town's building permit for the Project.

3.7.2 The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations and lawful orders of public authorities bearing on performance of the Work.

3.7.3 It is not the Contractor's responsibility to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, building codes, and rules and regulations. However, if the Contractor observes that portions of the Contract Documents are at variance therewith, the Contractor shall promptly notify the Architect and Owner in writing, and necessary changes shall be accomplished by appropriate Modification.

3.7.4 If the Contractor performs Work knowing it to be contrary to laws, statutes, ordinances, building codes, and rules and regulations without such notice to the Architect and Owner, the Contractor shall assume full responsibility for such Work and shall bear the attributable costs.

3.8 ALLOWANCES

3.8.1-3.8.2 OMITTED.

3.9 SUPERINTENDENCE

3.9.1 The Contractor shall employ a competent superintendent, acceptable to the Owner, and necessary assistants who shall be in attendance at the Project site full time during the progress of the Work until the date of Substantial Completion, and for such additional time thereafter as the Architect may determine to be necessary for the expeditious completion of the Work. The superintendent shall be licensed to act as superintendent in accordance with all applicable laws for projects of this type. The Contractor shall remove the superintendent if requested to do so in writing by the Owner, and shall promptly replace him with a competent person reasonably acceptable to the Owner. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

3.9.2 The Contractor shall retain a competent Registered Professional Engineer or Registered Land Surveyor, acceptable to the Architect, who shall establish the exterior lines and required elevations of all buildings and structures to be erected on the site and shall establish sufficient lines and grades for the construction of associated Work such as, but not limited to, roads, utilities and site grading. The Engineer or Land Surveyor shall certify as to the actual location of the constructed facilities in relation to property lines, building lines, easements, and other restrictive boundaries.

3.9.3 The Contractor shall establish the building grades, lines, levels, column, wall and partition lines required by the various Subcontractors in laying out their Work.

3.9.4 The Contractor shall coordinate and supervise the Work performed by Subcontractors to the end that the Work is carried out without conflict between trades and so that

no trade, at any time, causes delay to the general progress of the Work. If such delays occur, the Owner may deduct anticipated liquidated damages from the Progress Payments to the Contractor. The Contractor and all Subcontractors shall at all times afford each trade, any separate contractor, or the Owner, every reasonable opportunity for the installation of Work and the storage of materials.

3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

3.10.1 The Contractor shall prepare and submit to the Architect a progress schedule, and shall comply with such schedule, as described in Subparagraphs 8.2.4 through 8.2.8.

3.11 DOCUMENTS AND SAMPLES AT THE SITE

3.11.1 The Contractor shall maintain at the site for the Owner one record copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to record changes and selections made during construction, and in addition approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work.

3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the work.

3.12.3 Samples are physical examples which illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. The purpose of their submittal is to demonstrate for those portions of the Work for which submittals are required the way the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents. Review by the Architect is subject to the limitations of this Paragraph 3.12 and Paragraph 4.2.

3.12.5 The Contractor shall review, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents with reasonable promptness, in accordance with the Contractor's progress schedule approved by the Architect, and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors. Submittals made by the Contractor which are not required by the Contract Documents may be returned without action.

3.12.6 The Contractor shall perform no portion of the Work requiring submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been reviewed by the Architect. Such Work shall be in accordance with reviewed and approved submittals.

3.12.7 By approving and submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor thereby represents that the Contractor has determined and verified all dimensions, quantities, field dimensions, relations to existing work, coordination with work to be installed later, coordination with information on previously accepted Shop Drawings, Product Data, Samples, or similar submittals and verification of compliance with all the requirements of the Contract Documents. The accuracy of all such information is the responsibility of the Contractor. In reviewing Shop Drawings, Product Data, Samples, and similar submittals the Architect shall be entitled to rely upon the Contractor's representation that such information is correct and accurate.

3.12.8 The Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's review of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and the Architect has given written approval to the specific deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's review thereof.

3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. Unless such notice has been given, the Architect's review of a resubmitted Shop Drawing, Product Date, Sample, or similar submittal shall not constitute acceptance of any changes not requested on the prior submittal.

3.12.10 Informational submittals upon which the Architect is not expected to take responsible action may be so identified in the Contract Documents.

3.12.11 When professional certification of performance criteria of materials, systems or equipment is required by the Contract Documents, the Owner shall be entitled to rely upon such certifications, and neither the Owner nor the Architect shall be expected to make any independent examination with respect thereto.

3.12.12 The Architect will not check dimensions or quantities on any Shop Drawings and will not assume any responsibility for any errors in dimensions or quantities on Shop Drawings.

3.13 USE OF SITE

3.13.1 The right of possession of the premises and the improvements made thereon by the Contractor shall remain at all times in the Owner. The Contractor's right to entry and use thereof arises solely from the permission granted by the Owner under the Contract Documents. The Contractor shall confine the Contractor's apparatus, the storage of materials and the

operations of the Contractor's workers to limits indicated by law, ordinances, the Contract Documents and permits and/or directions of the Architect, and shall not unreasonably encumber the premises with the Contractor's materials. The Owner shall not be liable to the Contractor, the Subcontractors, their employees or anyone else with respect to the conditions of the premises, except only for a condition caused directly and solely by the negligence of the Owner.

3.14 CUTTING AND PATCHING

3.14.1 The Contractor and its Subcontractors shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly, all to be performed in accordance with the requirements of the Contract Documents.

3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

3.15 CLEANING UP

3.15.1 The Contractor daily shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work the Contractor shall remove from and about the Project waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials. Immediately prior to the Architect's inspection for Substantial Completion, the Contractor shall completely clean the premises. Concrete and ceramic surfaces shall be cleaned and washed. Resilient coverings shall be cleaned, waxed and buffed. Woodwork shall be dusted and cleaned. Sash, fixtures and equipment shall be thoroughly cleaned. Stains, spots, dust, marks and smears shall be removed from all surfaces. Hardware and all metal surfaces shall be cleaned and polished. Glass and plastic surfaces shall be thoroughly cleaned by professional window cleaners. All damaged, broken or scratched glass or plastic shall be replaced by the Contractor at the Contractor's expense.

3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the cost thereof shall be charged to the Contractor.

3.15.3 The provisions of paragraphs 3.15.1 and 3.15.2 shall apply equally to all subcontractors at the project insofar as each subcontractor's work is concerned.

3.16 ACCESS TO WORK

3.16.1 The Contractor shall provide the Owner and Architect access to the work in preparation and progress wherever located.

3.17

ROYALTIES AND PATENTS

3.17.1 The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

3.18

INDEMNIFICATION

3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expense, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including loss of use resulting therefrom, caused in whole or in part by negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Paragraph 3.18.

3.18.2 In claims against any person or entity indemnified under this Paragraph 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under this Paragraph 3.18 shall not be limited by a limitation on the amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' or workmen's compensation acts, disability benefit acts, or other employee benefit acts.

3.18.3 The obligations of the Contractor under this Paragraph 3.18 shall not extend to the liability of the Architect, the Architect's consultants, and agents and employees of any of them arising out of (1) the preparation of maps, Drawings, opinions, reports, surveys, Change Orders, designs or Specifications, or (2) directions or instructions given by the Architect, the Architect's consultants, and agents or employees of any of them.

3.19

COVENANT NOT TO SUE

3.19.1 In consideration of the Contractor's undertaking to indemnify and hold harmless the Architect, the Architect's consultants and agents or employees of any of them, in accordance with Paragraph 3.18, agree that the Architect will not bring any civil suit, action or other proceeding in law, equity or arbitration against the Contractor, or the officers, employees, agents and servants of the Contractor, for or on account of any action which the Architect may have arising out of or in any manner connected with the Work, except to enforce the provisions of

Paragraph 3.18 and this Paragraph 3.19; and the Contractor, or any successor, assign or subrogee of the Contractor, agrees not to bring any civil suit, action or other proceeding in law, equity or arbitration against the Architect, or the officers, employees, agents and servants of the Architect, for the enforcement of any action which the Contractor may have arising out of or in any manner connected with the Work.

3.20 RECORD KEEPING REQUIREMENTS

3.20.1 The Contractor shall comply with all applicable requirements of Mass. Gen. Laws Chapter 30, Section 39R.

ARTICLE 4

ADMINISTRATION OF THE CONTRACT

4.1 ARCHITECT

4.1.1 The Architect is the person lawfully licensed to practice architecture or an entity lawfully practicing architecture identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The term "Architect" means the Architect or the Architect's authorized representative.

4.1.2 Duties, responsibilities and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Contractor and Architect. Consent shall not be unreasonably withheld. To the extent inconsistent herewith, the rights and responsibilities of the Architect shall be governed by the Owner/Architect Agreement for the Project.

4.1.3 In case of termination of employment of the Architect, the Owner shall appoint an architect whose status under the Contract Documents shall be that of the former architect.

4.2 ARCHITECT'S ADMINISTRATION OF THE CONTRACT

4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents. The Architect will advise and consult with the Owner. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents, unless otherwise modified by written instrument in accordance with other provisions of the Contract.

4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction to become generally familiar with the progress and quality of the completed Work and to determine in general if the Work is being performed in a manner indicating that the Work, when completed, will be in accordance with the Contract Documents. The Architect will visit the site at least once per week during periods of active construction. The Architect will not be required to make exhaustive or continuous on-site inspections to check quality or quantity of the Work. On the basis of on-site observations as an architect, the Architect will keep the Owner informed

of progress of the Work, and will endeavor to guard the Owner against defects and deficiencies in the Work.

4.2.3 The Architect will not have control over or charge of and will not be responsible for construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work, since these are solely the Contractor's responsibility as provided in Paragraph 3.3. The Architect will not be responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents. The Architect will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or of any other persons performing portions of the Work.

4.2.4 Communications Facilitating Contract Administration. Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate through the Project Manager. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers generally shall be through the Contractor, although the Owner and Project Manager may have direct communications with subcontractors and suppliers intended to facilitate or expedite construction. Communications by and with separate contractors shall be through the Owner.

As to any written communications between two of the three of the Owner, Architect, and Contractor, a concurrent copy shall be sent to the third.

4.2.5 The Architect will have authority to reject Work which does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable for implementation of the intent of the Contract Documents, the Architect will have authority to require additional inspection or testing of the Work in accordance with Subparagraphs 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons performing portions of the Work.

4.2.6 In accordance with generally accepted standards of professional practice the Architect will review, approve, and take other appropriate action upon the Contractor's submittals such as Shop Drawings, Product Data and Samples, for the purpose of checking for conformance with the Contract Documents. The Architect's action will be taken with reasonable promptness, while allowing sufficient time in the Architect's professional judgment to permit adequate review, and in any event shall take no longer than the time permitted by law. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of obligations set forth in Paragraphs 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods,

techniques, sequences or procedures. The Architect's action with respect to any specific item shall not indicate approval of an assembly of which the item is a component.

4.2.7 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Paragraph 7.4.

4.2.8 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion, will receive and forward to the Owner for the Owner's review and records written warranties and related documents required by the Contract and assembled by the Contractor, and will issue a final Certificate for Payment upon compliance with the requirements of the Contract Documents.

4.2.9 If the Owner and Architect agree in writing, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents. If no such exhibit has been so incorporated, the duties, responsibilities, and limitations of authority of such project representatives shall be as set forth in the edition of AIA Document B352 current as of the date of the Agreement.

4.2.10 The Architect will interpret and decide matters concerning performance under and requirements of the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made with reasonable promptness and within any time limits agreed upon. The Architect may, as the Architect judges desirable, issue additional drawings or instructions indicating in greater detail the construction or design of the various parts of the Work; such drawings or instructions may be effected by field order or other notice to the Contractor, and provided such drawings or instructions are reasonably consistent with the previously existing Contract Documents, the Work shall be executed in accordance with such additional drawings or instructions without additional cost or extension of the Contract Time. If the Contractor claims additional cost or time on account of such additional drawings or instructions, the Contractor shall give the notice provided in Subparagraph 4.3.7.

4.2.11 Interpretations and decisions of the Architect will be consistent with the intent of and reasonably inferable from the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by the Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions so rendered in good faith.

4.2.12 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

4.3 CLAIMS AND DISPUTES

4.3.1 **Definition.** A Claim is a demand or assertion by one of the parties seeking, as a matter of right, adjustment or interpretation of Contract terms, payment of money, extension of time or other relief with respect to the terms of the Contract. The term "Claim" includes Change

Order requests by the Contractor as well as other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. Claims must be made by written notice. The responsibility to substantiate Claims shall rest with the party making the Claim.

4.3.2 Decision of Architect. Claims arising prior to final payment or the earlier termination of the Contract shall be referred initially to the Architect for action as provided in Paragraph 4.4. Action by the Architect, as provided in Paragraph 4.4, shall be required as a condition precedent to arbitration of a Claim between the Contractor and Owner as to all such matters arising prior to the date final payment is due. Action by the Architect in response to a Claim shall not be a condition precedent to arbitration in the event (1) the position of Architect is vacant; (2) the Architect has failed to take action as required under Subparagraph 4.4.1 within 15 days after the Claim is made; (3) the Architect has failed to take action required under Subparagraph 4.4.4 within 30 days after the Claim is made, unless the Architect has notified the parties in writing of the reasons why action could not be taken within 30 days, and of the date by which action will be taken; or (4) the Claim relates to a mechanic's lien.

4.3.3 Time Limits on Claim. Claims by either party must be made within 35 days after occurrence of the event giving rise to such Claim or within 35 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later. Claims must be made by written notice. Any change or addition to a previously made Claim shall be made by timely written notice in accordance with this Subparagraph 4.3.3.

4.3.4 Continuing Contract Performance. Pending final resolution of a Claim including arbitration, unless otherwise agreed in writing the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

4.3.5 Waiver of Claims: Final Payment. The making of final payment shall constitute a waiver of Claims by the Owner except those arising from:

- .1 liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents; or
- .3 terms of special warranties required by the Contract Documents.

Any Claim which has not been waived in accordance with this Subparagraph shall be deemed to have accrued upon discovery by the Owner of the condition or breach upon which such Claim is based, for the purpose of any applicable statute of limitation.

4.3.6 Claims for Differing Subsurface or Latent Physical Conditions. If, during the progress of the Work, the Contractor or the Owner discovers that the actual subsurface or latent physical conditions encountered at the site differ substantially or materially from those shown on the plans or indicated in the Contract Documents, either the Contractor or the Owner may request

an equitable adjustment in the Contract Sum applying to Work affected by the differing site conditions. A request for such an adjustment shall be in writing and shall be delivered by the party making such claim to the other party as soon as possible after such conditions are discovered. Upon receipt of such a claim from a Contractor, or upon its own initiative, the Owner shall make an investigation of such physical conditions, and, if they differ substantially or materially from those shown on the plans or indicated in the Contract Documents or from those ordinarily encountered and generally recognized as inherent in Work of the character provided for in the plans and Contract Documents and are of such a nature as to cause an increase or decrease in the cost of performance of the Work or a change in the construction methods required for the performance of the Work which results in an increase or decrease in the cost of the Work, the Owner shall make an equitable adjustment in the Contract Sum and the Contract shall be modified in writing accordingly.

4.3.6.1 Should conditions encountered below the surface of the ground require that footings, foundations or other parts of the building or other structure be raised, lowered or changed, or if additional depth of excavation below the levels shown on the Drawings is required in order to provide proper bearing for the building or other structure or for any permanent utilities on the site or for permanent grading or other permanent site work, any change in the amount of excavation, dewatering, sheeting, protection, rock excavation, backfill, concrete or other structural work, or any other work permanently incorporated in the building shall be considered a change in the Work, and the Contract Sum shall be adjusted as provided in this Article, provided that the Work has been ordered in writing as provided in 7.1.1.

4.3.7 Claims for Additional Cost or Time. If the Contractor claims that any acts or omissions of the Owner or the Architect, including any instructions or orders, whether oral, written, by Drawings, or otherwise, involve extra cost or time, and the Contractor has not received a written acknowledgment by the Owner or Architect that extra payment will be made or time extended on account thereof, the Contractor shall promptly so notify the Architect in writing of such Claim and shall not proceed with the Work relating to such Claim until the Contractor has received a further written order to proceed except, as provided in Paragraph 10.3, in the case of an emergency affecting life or property. No Claim by the Contractor on account of such acts, omissions, instructions or orders shall be valid unless the Contractor has so notified the Architect before proceeding, and has received the further written order to proceed.

4.3.7.1 OMITTED

4.3.7.2 The Contractor shall have the burden of demonstrating the effect of the claimed act or omission on the Contract Sum or Contract Time, and shall furnish the Architect with such documentation relating thereto as the Architect may reasonably require. In the case of a continuing act or omission only one Claim is necessary.

4.3.7.3 Adverse weather conditions shall not be the basis for a Claim for additional time or cost.

4.3.8 Injury or Damage to Person or Property. If either party to the Contract suffers injury or damage to person or property because of an act or omission of the other party, of any of

the other party's employees or agents, or of others for whose acts such party is legally liable, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after first observance. The notice shall provide sufficient detail to enable the other party to investigate the matter. If a Claim for additional cost or time related to this Claim is to be asserted, it shall be filed as provided in Subparagraph 4.3.7.

4.4 REVIEW OF CLAIMS BY ARCHITECT

4.4.1 The Architect shall take one or more of the following actions within ten days of receipt of a Claim: (1) defer any action with respect to all or any part of a Claim and request additional information from either party; (2) decline to render a decision for any reason which he deems appropriate (including but not limited to the fact that the Claim involves allegations of fault on the part of the Architect); (3) render a decision on all or a part of the Claim, or (4) submit a schedule to the parties indicating when the Architect expects to take action. The Architect shall notify the parties in writing of any action taken with respect to such Claim. If the Architect renders a decision or declines to render a decision, either party may proceed in accordance with Paragraph 4.5. If the Architect decides that the Work relating to such Claim should proceed regardless of his disposition of such Claim, the Architect shall issue to the Contractor a written order to proceed. The Contractor shall proceed as instructed, and all rights of both parties with respect to such Claim shall be deemed to have been reserved.

4.4.2 If a Claim is resolved by agreement of the parties, the Architect will prepare or obtain appropriate documentation indicating the parties' agreement to the resolution. In the absence thereof the Claim shall be treated as not resolved.

4.4.3 If a Claim has not been resolved, the party making the Claim shall, within ten days after the Architect's request, take one or more of the following actions: (1) submit additional supporting data requested by the Architect; (2) modify the initial Claim; (3) respond to the Architect's action under paragraph 4.4.1; or (4) notify the Architect that the initial Claim stands. Upon receipt of the response or supporting data, the Architect will either reject or approve the claim in whole or in part.

4.5 ARBITRATION

4.5.1 Controversies and Claims Subject to Arbitration. Any Claim arising out of or related to the Contract, or the breach thereof, except claims relating to aesthetic effect, shall be settled by arbitration, subject to the foregoing provisions of paragraph 4.4 and the provisions of Subparagraph 4.5.7. Arbitration will be conducted in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association and judgment upon the award rendered by the Arbitrator or Arbitrators may be entered in any Court having jurisdiction thereof. In any such arbitration in which the amount stated in the demand is \$100,000 or less, a single arbitrator shall be appointed in accordance with the procedures set forth in the American Arbitration Association Construction Industry Arbitration Rules. In any such arbitration in which the amount stated in the demand is in excess of \$100,000, a panel of three arbitrators shall be appointed in accordance with the procedures set forth in the American Arbitration Association Construction Industry Arbitration Rules.

4.5.2 Rules For Arbitration. The parties may agree to any arbitration forum. If unable to agree, by default the forum shall be the American Arbitration Association. If the neutral arbitrator(s) is/are appointed by the American Arbitration Association, the said Association shall administer the arbitration and its Construction Industry Arbitration Rules shall govern all aspects of the proceeding including the enforcement of any award. If the neutral arbitrator(s) is/are not appointed by the American Arbitration Association, then the arbitrator(s) shall act as the administrator of the arbitration but the Construction Industry Arbitration Rules of the Association shall nonetheless govern all aspects of the proceeding, including the enforcement of any award. The arbitration panel shall have all of the powers and duties conferred on the Association pursuant to said rules.

In addition, the following rules shall govern the selection of arbitrators and the proceedings:

4.5.2.1 Neither party may appoint as arbitrator an employee or an owner of that party, nor the parent, spouse or child of an employee or owner of that party.

4.5.2.2 After the neutral arbitrator has been appointed, neither party may engage in ex parte communication with the arbitrator appointed by that party.

4.5.3 Contract Performance During Arbitration. During arbitration proceedings, the Owner and Contractor shall comply with Subparagraph 4.3.4.

4.5.4 When a written decision of the Architect states that the decision is final, any demand for arbitration of the matter covered by such decision must be made within two months after substantial completion of the project, as determined by the Architect in accordance with paragraph 9.8.2 hereof. The failure to demand arbitration within said two month period will result in the Architect's decision becoming final and binding upon the Owner and the Contractor.

4.5.4.1 A demand for arbitration shall be made within the time limits specified in Subparagraph 4.5.4, and in no event shall be made after the date when the institution of legal or equitable proceedings based on such Claim would be barred by the applicable statute of limitations.

4.5.5 Claims and Timely Assertion of Claims. A party who files a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded. When a party fails to include a Claim through oversight, inadvertence or excusable neglect, or when a Claim has matured or been acquired subsequently, the arbitrator or arbitrators may permit amendment.

4.5.6 Judgment on Final Award. The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

4.5.7 Notwithstanding any provision contained in this Paragraph 4.5 or elsewhere in the Contract Documents, the Owner reserves the following rights in connection with Claims and disputes between the Owner and the Contractor:

- .1 the right to institute legal action against the Contractor in any court of competent jurisdiction in lieu of demanding arbitration pursuant to this Paragraph 4.5, in which case the dispute or disputes which are the subject of such action shall be decided by such court, and not by arbitration;
- .2 the right to obtain from any court of competent jurisdiction a stay of any arbitration instituted by the Contractor, provided that the application for such stay is made before the appointment of the neutral arbitrator in such arbitration, in which case the dispute or disputes which are the subject of such arbitration shall be decided by such court, and not by arbitration;
- .3 the right to require the Contractor to join as a party in any arbitration between the Owner and the Architect relating to the Project, in which case the Contractor agrees to be bound by the decision of the arbitrator or arbitrators in such arbitration.

In case the Owner elects to proceed in accordance with 4.5.7.1 or 4.5.7.2 above, the word "litigation" shall be deemed to replace the word "arbitration" wherever the latter word appears in the Contract Documents.

ARTICLE 5

SUBCONTRACTORS

5.1 DEFINITIONS

5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or Subcontractors of a separate contractor.

5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the

Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect will promptly reply to the Contractor in writing stating whether or not the Owner or the Architect, after due investigation, has reasonable objection to any such proposed person or entity. Failure of the Owner or Architect to reply promptly shall constitute notice of no reasonable objection.

5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection, unless otherwise required by law to do so.

5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. The Contract Sum shall be increased or decreased by the difference in cost occasioned by such change and an appropriate Change Order shall be issued. However, no increase in the Contract Sum shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

5.2.4 The Contractor shall not change a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such change.

5.2.5 The form of each filed Subcontract shall be submitted to the Owner for its acceptance, which shall not be unreasonably withheld or delayed. The form of subcontract shall be that set forth in Mass. Gen. Laws Chapter 149, Section 44F. Each Subcontract shall expressly provide for the contingent assignment referred to in Paragraph 5.4.

5.3 SUBCONTRACTUAL RELATIONS

5.3.1 By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities which the Contractor, by these Documents, assumes toward the Owner and Architect, including without limitation the obligations set forth in Paragraph 3.18. Each Subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that Subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the Subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the Subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed Subcontract agreement which may be at

variance with the Contract Documents. Subcontractors shall similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

5.4.1 Each Subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner provided that:

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Paragraph 14.2 and only for those Subcontract agreements which the Owner accepts by notifying the Subcontractor in writing; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

ARTICLE 6

CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTS

6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these, including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided elsewhere in the Contract Documents.

6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their progress schedules when directed to do so. The Contractor shall make any revisions to the progress schedules and Contract Sum deemed necessary after a joint review and mutual agreement. The progress schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

6.2 MUTUAL RESPONSIBILITY

- 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.
- 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgement that the Owner's or separate contractors' completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonable discoverable.
- 6.2.3 Costs caused by delays or by improperly timed activities or defective construction shall be borne by the party responsible therefor.
- 6.2.4 The Contractor shall promptly remedy damage wrongfully caused by the Contractor to completed or partially completed construction or to property of the Owner or separate contractors as provided in Subparagraph 10.2.5. If such separate contractor sues or initiates an arbitration proceeding against the Owner on account of any damage alleged to have been caused by the Contractor, the Owner shall notify the Contractor, who shall defend such proceedings at the Contractor's expense, and if any judgment or award against the Owner arises therefrom the Contractor shall pay or satisfy it and shall reimburse the Owner for all attorneys' fees and court or arbitration costs which the Owner has incurred.
- 6.2.5 Claims and other disputes and matters in question between the Contractor and a separate contractor shall be subject to the provisions of Paragraph 4.3 provided the separate contractor has reciprocal obligations.
- 6.2.6 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Paragraph 3.14.

6.3 OWNER'S RIGHT TO CLEAN UP

- 6.3.1 If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish as described in Paragraph 3.15, the Owner may clean up and allocate the cost among those responsible as the Architect determines to be just.

ARTICLE 7

CHANGES IN THE WORK

7.1 CHANGES

7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.

7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

7.1.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are so changed in a proposed Change Order or Construction Change Directive that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

7.2 CHANGE ORDERS

7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect, stating their agreement upon all of the following:

- .1 a change in the Work;
- .2 the amount of the adjustment in the Contract Sum, if any; and
- .3 the extent of the adjustment in the Contract Time, if any.

7.3 CONSTRUCTION CHANGE DIRECTIVES

7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work and stating a proposed basis for adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

7.3.3 Upon request of the Owner or the Architect, the Contractor shall without cost to the Owner submit to the Architect, in such form as the Architect may require, an accurate written estimate of the cost of any proposed extra Work or change contemplated by a Construction Change Directive. The estimate shall indicate the quantity and unit cost of each item of materials, and the number of hours of work and hourly rate for each class of labor, as well as the description and amounts of all other costs chargeable under the terms of this Article. Unit labor costs for the installation of each item of materials shall be shown if required by the Architect. The Contractor shall promptly revise and resubmit such estimate if the Architect determines that it is not in compliance with the requirements of this Article, or that it contains errors of fact or mathematical errors. If required by the Architect, in order to establish the exact cost of new Work added or of previously required Work omitted, the Contractor shall obtain and furnish to the Architect bona fide proposals from recognized suppliers for furnishing any material included in such Work. Such estimates shall be furnished promptly so as to occasion no delay in the Work, and shall be furnished at the Contractor's expense. The Contractor shall state in the estimate any extension of time required for the completion of the Work if the change or extra work is ordered.

7.3.3.1 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods, as selected by the Owner:

- (a) By unit prices stated in the Contract Documents or otherwise mutually agreed upon.
- (b) By Cost and Percentages (as defined below) estimated by the Contractor as provided in Subparagraph 7.3.3 and accepted by the Owner; the Contractor's estimate shall become a fixed price which shall not be changed by any variation in the actual cost of executing the Work covered by the change.
- (c) By actual Cost determined after the Work covered by the change is completed, plus Percentage.
- (d) By use of the dispute resolution procedures set forth in Paragraph 4.3.

As used in this Paragraph 7.3, "Cost" shall mean the estimated or actual net increase or decrease in cost to the Contractor, Subcontractor, or Sub-subcontractor for performing the Work covered by the change, including actual payments for materials, equipment, rentals, expendable items, wages and associated benefits to workmen and to supervisors employed full time at the site, insurance, bonds and other provable direct costs, but not including any administrative, accounting or expediting costs, or other indirect or overhead costs, or any wages or benefits of supervisory personnel not assigned full time to the site, or any amount for profit or fee to the Contractor, Subcontractor or Sub-subcontractor.

"Percentage" shall mean an allowance to be added to or subtracted from the Cost in lieu of overhead and profit and of any other expense which is not included in the Cost of the Work

covered by the change, as defined above. Percentage for a Sub-subcontractor shall be 10% of any net increase or decrease of Cost of any Work performed by the Sub-subcontractor's own forces plus 5% of any aggregate net increase in Cost of any Work performed for the Sub-subcontractor by other contractors. Percentage for a Subcontractor shall be such percentage allowances for overhead and profit as are set forth in the Subcontract between such Subcontractor and the Contractor. Percentage for the Contractor shall be 9 1/2% of any net increase or decrease of Cost of any Work performed by the Contractor's own forces plus 4 1/2% of any net increase or decrease in the Cost for all other Work covered by the change.

When in the reasonable judgment of the Architect a series of Construction Change Directives or Change Orders effect a single change, Percentage shall be calculated on the cumulative net increase or decrease in Cost, if any.

7.3.3.2 If the Owner elects to determine the cost of the Work as provided in method (a) of sub-Subparagraph 7.3.3.1, the unit prices shall be subject to Subparagraph 7.1.4.

Notwithstanding the inclusion of unit prices in the Contract Documents, it shall be the Owner's option to require the Cost of any given change to be determined by one of the other methods stated in 7.3.3.1. If the Owner elects to determine the Cost of the change by unit prices and the nature of the work is such that its extent cannot readily be measured after the completion of such work or any subsequent work, the Contractor shall keep daily records, available at all times to the Architect for inspection, of the actual quantities of such work put in place, and delivery receipts or other adequate evidence, acceptable to the Architect, indicating the quantities of materials delivered to the site for use in such unit price work, and distinguishing such other similar material delivered for use in work included in the base Contract Sum. If so required by the Architect, materials for use in unit price work shall be stored apart from all other materials on the Project.

7.3.3.3 If the Owner elects to determine the cost of the Work as provided in methods (c) or (d) of sub-Subparagraph 7.3.3.1 or if the method of determining the cost has not been established before the Work is begun, the Contractor shall keep detailed daily records of labor and materials costs applicable to the Work.

7.3.4 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

7.3.5 A Construction Change Directive signed by the Contractor indicates the agreement of the Contractor therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

7.3.6 If the Owner and Contractor do not agree with the adjustment in Contract Sum or Contract Time or the method for determining the adjustment, the dispute shall be governed by the procedures set forth in Paragraph 4.3.

7.4 MINOR CHANGES IN THE WORK

7.4.1 The Architect will have authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes shall be effected by written order and shall be binding on the Owner and Contractor. The Contractor shall carry out such written orders promptly.

ARTICLE 8

TIME

8.1 DEFINITIONS

8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

8.1.2 The date of commencement of the Work is the date established in the Agreement. The date shall not be postponed by the failure to act of the Contractor or of persons or entities for whom the Contractor is responsible.

8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Paragraph 9.8.

8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

8.2 PROGRESS AND COMPLETION

8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor. The date of commencement of the Work shall not be changed by the effective date of such insurance. Unless the date of commencement is established by a notice to proceed given by the Owner, the Contractor shall notify the Owner in writing not less than five days or other agreed period before commencing the Work to permit the timely filing of mortgages, mechanic's liens and other security interests.

8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

8.2.4 Within two weeks after award of the Contract, the Contractor shall submit to the Architect a Progress Schedule showing for each class of work the percentage completion to be obtained and the total dollar value of work to be completed as of the first of each month until Substantial Completion.

8.2.5 The Progress Schedule shall be based on an orderly progression of the Work, allowing adequate time for each operation (including adequate time for submission and review of submittals), and leading to a reasonable certainty of Substantial Completion by the date established in the Agreement. The Progress Schedule will be reviewed by the Architect for compliance with the requirements of this Article and will be accepted by the Architect or returned to the Contractor for revision and resubmittal. Unless specifically required by law, no payment under this Contract shall be due until the Progress Schedule has been approved by the Architect.

8.2.6 If in any application for payment as provided for in Paragraph 9.2, the total value of the completed Work in place, as certified by the Architect, is less than 90% of the total value of the Work in place estimated in the Progress Schedule, the Owner may, at the Owner's option, require the Contractor to accelerate the progress of the Work without cost to the Owner by increasing the work force or hours of work, or by other reasonable means approved by the Architect.

8.2.7 If each of three successive applications for payment indicate that the actual Work completed, as certified by the Architect, is less than 90% of the values estimated in the Progress Schedule to be completed by the respective dates, the Owner may at the Owner's option, treat the Contractor's delinquency as a default justifying the action permitted under Paragraph 14.2.

8.2.8 If the Architect has determined that the Contractor should be permitted to extend the time for completion as provided in Paragraph 8.3, the calendar dates in the Progress Schedule shall be adjusted accordingly to retain their same relationship to the adjusted date of Substantial Completion, and the dollar value of Work to be completed as of the first of each month shall be adjusted pro rata.

8.2.9 If the Contractor fails to submit any application for payment in any month, the Architect shall, for the purpose of this evaluation of progress, certify separately to the actual value of the Work in place completed as of the first of the month and to the best of the Architect's knowledge.

8.2.10 Nothing herein shall limit the Owner's right to liquidated or other damages for delays by the Contractor or to any other remedy which the Owner may possess under other provisions of the Contract Documents or by law.

8.2.11 The Progress Schedule required hereunder shall be a CPM Schedule in accordance with the Project Specifications and shall be updated in accordance therewith.

8.3 DELAYS AND EXTENSION OF TIME

8.3.1 If the Contractor is delayed at any time in progress of the Work by an act or neglect of the Owner or Architect, of an employee of either, or of a separate contractor employed by the Owner, or by changes ordered in the Work, or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes (except weather) beyond the Contractor's control, or by delay authorized by the Owner, or by other causes which the Architect determines may justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Paragraph 4.3.

8.3.3 The Contractor hereby agrees that the Contractor shall have no claim for damages of any kind against the Owner or the Architect on account of any delay in the commencement of the Work and/or any delay or suspension of any portion of the Work, whether such delay is caused by the Owner, the Architect, or otherwise, except as specifically provided in Subparagraphs 2.3.2 and 2.3.3. The Contractor acknowledges that, except as provided therein, the Contractor's sole remedy for any such delay and/or suspension will be an extension of time as provided in this Article.

8.3.4 No claim for delay shall be allowed on account of failure of the Architect to furnish Drawings, Specifications or instructions or to return Shop Drawings or Samples until the expiration of the applicable time period referred to in Mass. Gen. Laws Chapter 30, Section 39P, and not then unless such claim be reasonable.

8.3.5 No extension of time shall be granted because of seasonal or abnormal variations in temperature, humidity or precipitation, which conditions shall be wholly at the risk of the Contractor, whether occurring within the time originally scheduled for completion or within the period of any extension granted. There shall be no increase in the Contract Sum on account of any additional costs of operations or conditions resulting therefrom.

ARTICLE 9

PAYMENTS AND COMPLETION

9.1 CONTRACT SUM

9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the maximum amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents, or in equity, should the Contractor assert a quantum meruit claim for the fair value of Contractor's Work, regardless of whether the Contractor is terminated hereunder.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

- A. Temporary materials may be new or used, but must be adequate in capacity for the required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.
- B. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil (0.25-mm) minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.
- C. Dust-Control Adhesive-Surface Walk-off Mats: min. 20" x 30" size Dirt Catcher Super Sticky Mat by 3M.

2.02 PROTECTION OF THE EXISTING CONSTRUCTION, FURNISHINGS AND FINISHES

- A. Where necessary, fully cover and protect the existing construction, furnishings and finishes with heavy duty cotton drop clothes or plastic sheeting to prevent any damages or soiling resulted from performing the Work of this Contract.
 - 1. Contractor shall cover the entire floor surfaces of the access routes used for construction but outside of the designated construction areas with heavyweight non-staining 46 mil Ram Board, taping the edges to maintain position. Reapply papers as required to maintain proper floor protection.
 - 2. Where staging, hoisting, and/or heavy construction equipment are used, overlay Ram Board with 1/2" thick plywood or 440 Homasote to protect existing flooring from any soiling or damage caused by the work of this Contract.
 - 3. At every interior temporary exit from the construction areas, provide a zippered plastic sheeting door and a Dust-Control Adhesive-Surface Walk-off Mat. Replace mat when no longer effective.
- B. Clean, repair, and restore damages and soiling caused by the work of this Contract at no cost to the Owner. Immediately remove and replace the damaged existing construction, furnishings and finishes beyond repair at the Contractor's expenses.

2.03 TEMPORARY FIRE PROTECTION

- A. Contractor shall take all necessary precautions for the prevention of fire during construction. Keep work area orderly and clean and remove combustible rubbish promptly off site. Combustible materials shall be stored on site in a manner and at locations acceptable to local Fire Officials. Contractor shall comply with all suggestions regarding fire protection made by the insurance company with which the Owner maintains his fire insurance.
- B. Contractor shall provide and maintain in good working order, under all conditions, readily available to all portions of the work area, suitable and adequate fire protection equipment and services. Such facilities shall include, but not be limited to, two (2) UL labeled, 2-1/2 gal. Type ABC fire extinguishers.

2.04 TEMPORARY STAGING AND SCAFFOLDING

- A. Contractor shall furnish, erect, and maintain in safe condition all staging and scaffolding required to properly carry out and complete the work. Staging and scaffolding thus provided shall comply in all respects to the governing laws and codes.

2.05 TEMPORARY HOISTING EQUIPMENT AND MACHINERY

- A. Contractor shall furnish, install, operate, and maintain in safe condition all hoisting equipment and machinery required to properly carry out and complete the work. All hoisting equipment and machinery, and operation shall comply in all respects to the governing laws and codes.

TEMPORARY UTILITIES

- A. Contractor will be allowed to make connection and/or utilize Owner's existing water and electricity where required for the performance of the work. Contractor shall be responsible for furnishing, installing, and maintaining temporary facilities required for use and further specified as follows:

1. Owner will pay for water and electrical energy used on the Project from the beginning of construction operations to the Date of Substantial Completion of the Work.
2. The furnishing of utilities by the Owner for the convenience of the Contractor and without charge shall be conditional upon the Contractor being conservative and prudent in their use. In the event Contractor are repeatedly wasteful in the use of the utilities thus provided, the Owner reserves the right to charge Contractor at an equitable rate for the energy consumed.

3.02 TEMPORARY LIGHTING

- A. The Contractor shall be responsible to arrange for adequate indoor lighting to illuminate staging, dangerous projections, and the like as required to protect the safety of workmen and other personnel.
- B. The Contractor shall furnish all extension cords, task lights, and accessories required to adequately illuminate the work surfaces for proper execution of the work.

3.03 TEMPORARY TRASH REMOVAL

- A. Contractor shall be responsible for trash removal for all trades, and shall have the trash and construction debris hauled away, and legally disposed of off the site on daily basis. At his discretion, Contractor may provide dumpster type trash container for his own use and for the use by all subcontractors. The dumpster thus provided must be placed at a location approved by the Owner and shall be emptied at sufficient intervals to maintain the capacity and continuously ready to receive trash and debris. Use of the Owner's dumpster shall be strictly prohibited.
- B. Construction waste disposal must comply with the 310 CMR 19.017: Massachusetts Waste Disposal Ban Regulation.

3.04 NOISE, DUST, AND POLLUTION CONTROL

- A. All work performed under the Contract shall conform to the requirements of Massachusetts General Laws Chapter III, Sections 31C and 142D, and Rules and Regulations adopted thereto by the Massachusetts Department of Public Health, and the requirements of local noise, dust, and pollution control ordinances, and regulative agencies applicable to the work.

3.05 TEMPORARY STORAGE FACILITIES

- A. Space for storage shall be confined to within the work areas unless at other specific locations as directed and approved by the Owner in writing.
- B. Storage of material within the existing building will be permitted only provided such storage, and the handling required thereby, does not damage or overload the building structure or finishes, does not interfere with the safe and expeditious performance of the work, does not interfere with Owner's operations or block the required exit ways, and does not present or cause a fire or other hazard.

PART 3 - EXECUTION

4.01 TEMPORARY WEATHER PROTECTION

- A. Where building envelop elements of the building providing weather protection are to be temporarily opened to the weather, they shall be fully enclosed or covered with securely attached and well draining enclosures against inclement weather, to assure absolute weather protection. Any and all damages to the existing construction, including all materials, equipment, furnishings, and finishes thereon, caused by inadequate weather protection shall be immediately made good by the Contractor without further cost to the Owner.

4.02 TEMPORARY SANITARY FACILITY

- A. Use of any existing school sanitary facility is strictly prohibited. Contractor shall provide sufficient sanitary facility for his own use in accordance with Division 01 Section "Temporary Sanitary Facilities".

4.03 MAINTENANCE, TERMINATION, AND REMOVAL

- A. Enforce strict discipline in use of temporary facilities. Limit waste and abuse.
- B. Maintain temporary facilities in operating condition; repair damages immediately upon discovery. Unless otherwise requested by Owner, remove each temporary facilities when no longer useful. Clean and renovate existing work affected by the work of this contract.

END OF SECTION

SECTION 016000
PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 PRODUCTS INCORPORATED INTO THE WORK

- A. Conform to applicable specifications and standards.
- B. Comply with size, make, type and quality specified, or as specifically approved in writing by the Architect.
- C. Manufactured and Fabricated Products:
 - 1. Design, fabricate and assemble in accord with the best engineering and shop practices.
 - 2. Manufacture like parts of duplicate units to standard size and gages, to be interchangeable.
 - 3. Two or more items of the same kind shall be identical, by the same manufacturer.
 - 4. Products shall be suitable for service conditions.
 - 5. Equipment capacities, sizes, and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.
- D. Do not use material or equipment for any purpose other than that for which it is designed or is specified.
- E. No asbestos containing products or lead containing products shall be permitted on this Project.
- F. All finishes and materials used in this Project shall be low V.O.C.

1.02 WORKMANSHIP

- A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.
- B. Perform work by persons qualified to produce workmanship of specified quality.
- C. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

1.03 MANUFACTURERS' INSTRUCTIONS

- A. When work is specified to comply with manufacturers' instructions, submit copies of said instructions, as specified in Division 01 Section "Submittal Procedures", distribute copies to persons involved, and maintain one set in field office.
- B. Perform work in accordance with details of instructions and specified requirements. Should a conflict exist between Specifications and manufacturer's instructions, consult with Architect.

1.04 TRANSPORTATION AND HANDLING

- A. Arrange deliveries of products in accord with construction schedules, coordinate to avoid conflict with work and conditions at the site.
- B. Transport Products by methods to avoid Product damage; deliver in undamaged condition in manufacturer's unopened containers or packaging, dry.
- C. Provide equipment and personnel to handle Products by methods to prevent soiling or damage.
- D. Promptly inspect shipments to assure that Products comply with requirements, quantities are correct, and products are undamaged.

1.05 STORAGE AND PROTECTION

- A. Store Products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive Products in weather-tight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions.
- B. After installation, provide coverings to protect Products from damage from traffic and construction operations, remove when no longer needed.

1.06 PRODUCT OPTIONS

- A. Product options:
 - 1. Products specified only by reference standard: Any Product meeting that standard.
 - 2. Products specified by naming three or more manufacturers: Products of any named manufacturer meeting Specifications.
 - 3. Products specified by naming one manufacturer and "or equal": Submit a request for substitution for any manufacturer not specifically named.

1.07 PRODUCT SUBSTITUTIONS

- A. Substitutions of products shall comply with requirements of Chapter 30, Section 39M of General Laws, and additional requirements and procedures specified herein.
- B. Where products or materials are specified by manufacturer's name, trade name or catalog reference, an item shall be considered equal to the item so named or described if in the opinion of the Architect that:
 - 1. It is at least equal in quality, durability, appearance, strength and design; including compliance with applicable specifications and compatibility with physical space allocations provided for the item;
 - 2. It performs at least equally the function imposed by the general design for the work;
 - 3. It conforms substantially, even with deviations to the detailed requirements for the item as indicated by the Contract Documents.
- C. Should the Contractor, after the award of the Contract, wish to use any products or materials other than those specified, he shall request written permission of the Architect using Substitution Request Form attached at the end of this Section. His request shall name and adequately describe (including shop drawings) the proposed substitutions, furnish any information requested by the Architect, and state what difference, if any, will be made in the Contract price, including the cost of changes in the Work, for such substitutions should they be accepted. Upon receipt of complete information from the Contractor, the Architect will consider all aspects of the proposed substitution and advise the Contractor in writing approving or disapproving the substitution. The principal reasons for approval or disapproval of the substitution will be enumerated by the Architect. Disapproval of the substitution shall not be cause for an increase in Contract price or a delay in schedule.
- D. Request constitutes a representation that Contractor:
 - 1. Has investigated proposed Product and determined that it meets or exceeds, in all respects, specified Product.
 - 2. Will provide the same warranty for substitution as for specified Product.
 - 3. Will coordinate installation and make other changes which may be required for Work to be complete in all respects at no additional cost to the Owner.
 - 4. Waives claims for additional costs which may subsequently become apparent.
- E. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals without separate written request, or when acceptance will require substantial revision of Contract Documents.
- F. Architect will determine acceptability of proposed substitution, and will notify Contractor of acceptance or rejection in writing within a reasonable time.

END OF SECTION

SECTION 017300
EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 1. Examination.
 2. Preparation.
 3. Installation of the Work.
 4. Progress cleaning.
 5. Protection of installed construction.

1.03 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 1. Division 01 Section "Summary of Work": for limits on use of Project site.
 2. Division 01 Section "Submittal Procedures": for submitting surveys.
 3. Division 01 Section "Cutting and Patching": for execution requirements of executing cutting and patching.
 4. Division 01 Section "Contract Closeout": for requirements of executing final cleaning.

1.04 INFORMATIONAL SUBMITTALS

- A. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.05 QUALITY ASSURANCE

- A. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.01 [NOT USED.]

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, and water-service piping; underground plumbing and electrical services, and other utilities.
 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.

- 2. Examine walls, floors, roofs, and other substrates for suitable conditions where products and systems are to be applied or installed.
- 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - 1. Description of the Work.
 - 2. List of detrimental conditions, including substrates.
 - 3. List of unacceptable installation tolerances.
 - 4. Recommended corrections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.02 PREPARATION

- A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Division 01 Section "Project Coordination".

3.03 INSTALLATION OF THE WORK

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
 - 4. Maintain minimum headroom clearance of 96 inches in occupied spaces.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 2. Allow for building movement, including thermal expansion and contraction.
 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
 - J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.04 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration until Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.05 PROTECTION OF INSTALLED CONSTRUCTION

- A. Comply with manufacturer's written instructions for temperature and relative humidity.

- B. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration until date of Substantial Completion.
 - 1. Repair, restore, or replace if not repairable, any and all damaged work at no cost to the Owner.

END OF SECTION

4.01 ***

SECTION 017329
CUTTING AND PATCHING

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements for cutting, fitting, and patching required to complete the Work or to:
 1. Make several parts fit together properly.
 2. Uncover portions of the Work to provide for installations of ill-timed work.
 3. Remove and replace defective work.
 4. Remove and replace work not conforming to requirements of Contract Documents.
 5. Provide routine penetrations of non-structural elements.
- B. Unless otherwise specifically specified in other Sections, the Contractor shall coordinate and perform, or assign to the appropriate trades, all cutting, fitting, and patching.

1.02 QUALITY ASSURANCE

- A. Permission to patch any items of work does not imply a waiver of the Owner's right to require complete removal and replacement in said areas or said items if, in the Architect's opinion, patching does not satisfactorily restore quality and appearance of work.
- B. Do not cut-and-patch structural work in anyway resulting in a reduction of load-carrying capacity or load/deflection ratio.
- C. Do not cut-and-patch operational elements and safety- related components in any way resulting in a reduction of capacities to perform in the manner intended or resulting in decreased operational life, increased maintenance, or decreased safety.
- D. Do not cut-and-patch work that is exposed to view in a manner resulting in reduction of visual qualities or in substantial evidence of cut-and-patch work, both as judged solely by the Architect. Remove and replace visually unsatisfactory work as directed by Architect.

1.03 SUBMITTALS

- A. Submit a written request to the Architect well in advance of executing any cutting or alteration that affects:
 1. Work of the Owner or separate contractor.
 2. Structural value or integrity of any element of the Project.
 3. Integrity or effectiveness of weather-exposed or moisture-resistant elements or systems.
 4. Efficiency, operational life, maintenance, or safety of operational elements.
 5. Visual qualities of sight-exposed elements.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Except as otherwise indicated or authorized by the Architect, provide materials for cutting-and-patching which will result in equal-or-better work than the work being cut-and-patched, in terms of performance characteristics and including visual effect where applicable. Comply with the requirements of the material manufacturer, and use materials identical with the original materials where feasible and where recognized that satisfactory results can be produced thereby.
- B. Comply with specifications and standards for each specific product involved.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Inspect conditions of Project, including elements subject to damage or to movement during cutting and patching.
- B. After uncovering work, inspect conditions affecting installation of Products, or performance of work.

- C. Report unsatisfactory or questionable conditions to the Architect in writing; do not proceed with work until the Architect has provided further instructions.

3.02 PREPARATION

- A. Provide adequate temporary support as necessary to assure structural value or integrity of affected portion of Work.
- B. Provide devices and methods to protect other portions of the Project from damage.
- C. Provide protection from elements for that portion of the Project which may be exposed by cutting and patching work, and maintain excavations free from water.

3.03 PERFORMANCE

- A. Execute cutting and patching by methods that will prevent damage to other work, and will provide proper surfaces to receive installation of repairs.
 - 1. In general, where mechanical cutting is required, cut work with sawing and grinding tools, not with hammering and chopping tools. Core drill openings through concrete work.
 - 2. Prior to cutting any structural steel or concrete work, contact the Architect in writing. Do not cut any structural steel and concrete work until approval has been granted by the Architect.
- B. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes.
- C. Restore work which has been cut or removed; install new products to provide completed Work in accordance with requirements of Contract Documents.
- D. Patch with seams that are durable and as invisible as possible. Comply with specified tolerances for the work.
- E. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes:
 - 1. For continuous surfaces, refinish to nearest intersection.
 - 2. For an assembly, refinish entire unit.

END OF SECTION

4.01 ***

**SECTION 017700
CONTRACT CLOSE-OUT**

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements during contract close-out. Including, but not limited to:
 1. Substantial Completion.
 2. Final Acceptance.
 3. Record document submittal.
 4. Maintenance data.
 5. Warranties.
 6. Final cleaning.

1.02 SUBSTANTIAL COMPLETION

- A. Prior to requesting inspection for certification of Substantial Completion, complete the following:
 1. On Application for Payment, show 100% completion for portions of work claimed as substantially complete. Submit list of incomplete items, value of incomplete work, reasons work is not complete, and scheduled or projected time of completion.
 2. Submission of warranties.
 3. Submission of maintenance data and instructions.
 4. Submission of final Project Record Documents.
 5. Final cleaning.
 6. Application for reduction of retainage.
 7. Consent of surety.
 8. Notification of shifting insurance coverage.
- B. Within reasonable time, Architect will inspect to determine status of completion.
- C. Should the Architect determine Work is not substantially complete, he will promptly notify Contractor in writing, giving reasons therefor. The Architect's notification will be detailed or general as he deems appropriate to the actual status of completion observed.
 1. Reinspection Fees: Should Architect perform reinspection due to failure of Work to comply with claims made by the Contractor, the Contractor shall compensate Architect for such additional services at \$125/hr, and deduct the amount of such compensation from final payment to the Contractor.
- D. The Contractor shall substantially complete work, and remedy any noted deficiencies, and send a second written notice of substantial Completion. Architect will reinspect the Work.
- E. When Architect determines Work is Substantially Complete, he will prepare Certificate of Substantial Completion in accordance with the Consolidated General Conditions. Specific time period shall be established by the Certificate of Substantial Completion for the Contractor to complete all work for Final Acceptance.

1.03 FINAL ACCEPTANCE

- A. Prior to requesting final inspection for certification of Final Acceptance and final payment, complete the following:
 1. Submission of final payment request with releases and supporting documentation.
 2. Completion of incomplete Work.
 3. Assurances that unsettled claims have been or will be settled.
 4. Submission of updated final settlement, including accounting for final additional changes to the Contract Sum. Show additional Contract Sum, additions and deduction, previous Change Orders, Total Adjusted Contract Sum, previous payments and Contract Sum due.
 5. Submission of consent of surety.
 6. Submission of evidence of final, continuing insurance coverage complying with insurance requirements.

7. Prove that taxes, fees, and similar obligations have been paid.
 8. Remove temporary facilities and service.
 9. Remove surplus materials, rubbish and similar elements.
 10. Certify Work has been inspected for compliance with Contract Documents.
 11. Certify Work has been completed in accordance with Contract Documents, and deficiencies listed with Certificate of Substantial Completion have been corrected.
 12. Certify Work is complete and ready for final inspection.
 13. Certify materials incorporated have no asbestos containing materials or lead.
 14. Acceptance of Work by the Owner.
- B. The Architect will inspect to verify status of completion with reasonable promptness.
1. Should the Architect consider Work is incomplete or defective, the Contractor will promptly notify Contractor in writing, listing incomplete or defective work.
 2. The Contractor shall take immediate steps to remedy deficiencies and send a second written certification that Work is complete, and Architect will reinspect the work.
 3. When the Architect finds Work is acceptable, he will consider closeout submittals.
 4. Reinspection Fees: Should Architect perform reinspection due to failure of Work to comply with claims made by the Contractor, The Contractor shall compensate Architect for such additional services at \$125/hr, and deduct the amount of such compensation from final payment to the Contractor.
- C. Application for Final Payment: Submit Application for Final Payment in accordance with procedures and requirements of the Consolidated General Conditions.

1.04 RECORD DOCUMENTS

- A. General: Maintain a complete set of record Documents. Do not use Record Documents for construction purposes. Provide access to Record Documents for Architect's and Owner's reference. General, without limitation, Record Documents shall include the following:
 1. Record Drawings: Maintain a clean set of mylars of Contract Drawings and shop drawings, updated to show actual installation. Give particular attention to concealed items.
 2. Record Project Manual: Maintain a clean Project manual, including Addenda, Change Orders, Architect Field Orders, and other modifications, updated to show changes in actual work performed. Give particular attention to substitutions, selection of options, and similar information.
 3. Record Product Data: Maintain one copy of each approved Product Data submittal, updated to show changes from products delivered, work performed, and from manufacturer's recommended installation instructions.
 4. Record Samples: Maintain one copy of each approved Sample submitted.
- B. Maintenance of Documents and Samples: Store documents and samples in Contractor's office apart from documents used for construction. File documents and samples in accordance with CSI format. Maintain documents in clean, dry, legible conditions and in good order.
- C. Recording: Label each document "PROJECT RECORD" in neat large printed letters. Record information concurrently with construction progress. Do not conceal any work until required information is recorded.
- D. Drawings: Legibly update all Drawings to record actual construction, including the following:
 1. Field changes of dimension and detail.
 2. Changes made by Change Order.
 3. Details not in original Contract Documents.
- E. Specifications and Addenda: Legibly mark each Section to record:
 1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
 2. Changes made by Change Order.

- F. Submittal: At Contract Close-out, deliver Record Documents to Architect. Accompany submittal with transmittal letter in duplicate, indicating the date, project title and number, Contractor's name and address, title and number of Record Document, and signature of Contractor or his authorized representative.

1.05 MAINTENANCE DATA

- A. Prepare and submit Maintenance Data as specified in this Section and referenced in other pertinent Sections of Specifications. Organize Maintenance Data into suitable sets, bound and indexed. Mark appropriate identification on front and spine of each binder. Including the following types of information:
 1. Emergency instructions.
 2. Copies of warranties.
 3. Inspection procedures.
- B. Provide sufficient instruction to Owner's personnel in maintenance of products.
- C. Format of Data: Prepare data in form of instruction manual for use by the Owner's personnel. Format shall be 8-1/2 in. x 11 in., in 20 pound, white, typed pages. Text shall be manufacturer's printed data or neatly typewritten. Drawings shall be bound with text, with reinforced punched binder tabs/ fold larger drawings to sizes of text pages. Provide fly-leaf for each separate product or each piece of operating equipment. Provide indexed tabs.
 1. Binders: Provide commercial quality three-ring binders with durable and cleanable plastic covers, with maximum ring size of 1 inch. When multiple binders are used, correlate the data into related consistent groupings.
 2. Binder Cover: Identify each volume with typed or printed title 'Maintenance Instructions'. List the title of Project, identity of separate structure as applicable, and identity of general subject matter covered in the manual.
- D. Content of Manual: Neatly typewritten table of contents for each volume, arranged in systematic order, indicating the Contractor's name and address, and a list of each product, indexed to content of the volume. Provide a separate list with each product, name, address, and telephone number of subcontractor or installer, and local source of supplies for parts and replacement.
 1. Provide in each volume a copy of each warranty, bond, and service contract issued.

1.06 INSTRUCTION OF OWNER'S PERSONNEL

- A. Prior to final inspection or acceptance, provide adequate instructions to Owner's designated operating and maintenance personnel in the maintenance of all products. Instructions shall include an on-site training for Town of Arlington maintenance personnel. This training session shall be video recorded and transmitted to the Town of Arlington.
- B. Maintenance manual shall constitute the basis of instruction.

1.07 WARRANTIES

- A. General: assemble warranties, bonds, and service and maintenance contracts, executed by each of the respective manufacturers, suppliers, and subcontractors.
- B. Information required: provide information on the proper procedures in case of failure. Indicate instances which might affect the validity of warranty. Indicate Contractor, name of responsible principal, address, and telephone number.
- C. Form of Submittal: Prepare duplicate packets of 8-1/2 X 11 in., punched sheets for installation in standard three-ring binder. Fold larger sheets to fit into binders.
 1. Cover of Packet: Identify each packet with typed or printed title "WARRANTIES". List the project title and number, and name of Contractor.
 2. Binders: Bind into commercial quality, three-ring, with durable and cleanable plastic covers.

PART 2 - PRODUCTS

2.01 CLEANING MATERIALS

- A. Provide cleaning materials that will not create hazards to health nor property, and will not damage surfaces or finishes. Use only cleaning materials and methods recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.01 FINAL CLEANING

- A. Employ experienced workers or professional cleaners for Final Cleaning. Clean each surface to the condition expected in a normal building cleaning and maintenance program. Comply with manufacturer's instructions and recommendation.
- B. Clean and restore general work areas and adjoining surfaces soiled or damaged by the work of this Contract. Where performance of subsequent work could result in damage to completed work, provide protective covering to prevent potential damage.
- C. Complete the following cleaning operations prior to requesting inspection for Certification of Substantial Completion:
 1. All advertising matter and temporary instructional material shall be removed from exposed surfaces throughout. Remove labels that are not permanent.
 2. Clean work area of rubbish, littler and other foreign substances. Follow the product manufacturer's instructions; clean entire work area to a dust-free condition. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from sight-exposed surfaces.

END OF SECTION

SECTION 230001
CONDITIONS FOR HEATING, VETILATION, AND AIR CONDITIONING SYSTEMS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. These Conditions add to, supplement, the GENERAL and SPECIAL CONDITIONS of the Contract Documents. The General and Special Conditions are part of this Section and shall apply as if written in full herein.

1.02 SCOPE

- A. The work included in this section shall consist of providing all materials, labor, tools and incidentals necessary to install and make ready for owner's use a complete HEATING, VENTILATION, AND AIR CONDITIONING SYSTEM (HVAC) for the proposed building as called for in the contract documents.
- B. Review all drawings and visit the site; observe dimensions, construction, and details not shown on drawings.
- C. The following drawings are part of the contract documents and are included as part of the HVAC system pages. The system shall include, but is not limited to, the following drawings:
 - 1. CONTRACT DRAWINGS H0.0-H3.1 (6 SHEETS).

1.03 RESPONSIBILITY OF BIDDERS

- A. Bidders shall examine all drawings and specifications issued and SHALL VISIT THE SITE of work. Bidders must be familiar with codes, rules, and regulations (and their local interpretations) in effect at the site of the work.
- B. Where any of the above is at variance with the drawings and specifications, the code requirements shall take precedence, and any cost necessary to meet these shall be included in the bid price.
- C. This contractor is assumed to be skilled in the trade and is solely responsible for compliance with health and safety regulations, performing the work in a safe and competent manner, and in installation procedures required for the work as outlined in these documents.

1.04 MECHANICAL PLANS

- A. The mechanical plans are intended to be diagrammatic and are based on one manufacturer's equipment. They are not intended to show every item in its exact location, the exact dimensions, or all the details of the equipment. The contractor shall verify the actual dimensions of the equipment proposed to ensure that the equipment would fit in the available space.
- B. Installation shall be within the limitations imposed by the architectural, structural, electrical and plumbing requirements, with adequate space for maintenance

1.05 QUESTIONS AND CLARIFICATIONS OF THE BID DOCUMENTS

- A. Bidders shall not rely on verbal clarifications of the drawings or specifications. Any questions or clarifications shall be referred to the architect and/or engineer at least five working days prior to bidding to allow for issuance of an addendum. After the five-day deadline, bidder shall make a decision and qualify the bid, if the bidder feels it necessary.
- B. Bidder shall base bid on items of equipment actually named in bid documents or addendums issued prior to bidding.

1.06 GUARANTEES

- A. All equipment, materials, and workmanship shall be guaranteed for a period of one year, beginning with the date of acceptance of the project in writing. Special warranties will be called for under some sections of EQUIPMENT. This warranty shall be in writing and shall include written copies of factory warranties with expiration dates on items of equipment where the

warranty date might differ from the acceptance date, such as five-year warrantee of sealed refrigeration systems. No warrantee shall start before the acceptance date.

- B. The contractor's warranty shall include at least two inspections of the system to repair and replace any items found to be defective during this period. The first shall be approximately six months after the acceptance of the system and the second at the end of the first year.

1.07 REQUIRED SUBMITTALS

- A. Prior to starting any installation, submit no less than 2 nor more than 2 copies of items proposed for this work with necessary illustrations, drawings and engineering data for review by the engineer. Submit in time to allow no less than 15 working days for checking and transmittal without delaying the construction schedule. Submit all items at one time no less than 30 days after award of the contract.
- B. Submittals shall be clearly marked to show the intended item, with identification as to unit number or other marking to show location, service, and function. Submittals not marked to identify the equipment and application will be rejected
- C. Any equipment installed without prior acceptance shall be subject to rejection unless such items were identified by name and model number in the bid documents
- D. The supplier, by submitting, certifies that the materials or equipment proposed is satisfactory for the application intended, including adverse conditions that may prevail at the job site, and that the materials and equipment are in current production with no known plans to cease production.
- E. Contractor agrees that submittals processed by the engineer are not change orders; that the purpose of submittals by the contractor is to demonstrate to the engineer that the contractor understands the design concept; and that this understanding is demonstrated by indicating which equipment and materials he or she intends to furnish and install and the fabrication and installation methods he or she intends to use
- F. Contractor further agrees that if deviations, discrepancies, or conflicts between submittals and contract documents are discovered either prior to or after submittals is processed by the engineer, the contract documents shall control and shall be followed.
- G. Submittals shall include.
 - 1. All equipment; exhaust, heating, ventilation, etc.
 - 2. Voltage, phase, and amps of each electrical item such as motors, heaters etc.
 - 3. All auxiliary equipment. .
 - 4. Supply and return registers, grilles, etc.
 - 5. Pipe, valves, insulation, etc.

PART 2 - PRODUCTS

2.01 DESCRIPTION

- A. All products shall be first-line quality, of grade and type shown on the drawings and specified, or equivalents accepted by the architect or engineer in writing.
- B. All products shall be in current production with no notice having been given that this product is to be drastically changed, modified, or discontinued from production
- C. The supplier, by submitting, certifies that the equipment being proposed is proper for the application intended and that it has the capacity called for.

2.02 COMPLETE SYSTEM

- A. All products, materials, and accessories shall be furnished and installed as required for a complete system ready for owner's beneficial use.

2.03 EQUIPMENT AND MATERIAL DEVIATIONS

- A. When any material or equipment is identified on the plans or in the Specifications by reference to ONE manufacturer's name or model number, it is intended for the contractor to bid the

project using that manufacturer's product. As an alternate to the base bid, the contractor may submit a second bid with acceptable alternates that will be considered after the bid is awarded.

- B. Not used
- C. Bidders are advised to ascertain such acceptance from their suppliers by requesting copies of the acceptance in writing signed by the architect or engineer from their suppliers.

2.04 MOTORS AND STARTERS

- A. All electric motors shall be premium efficiency type with maximum of 1750 rpm with totally enclosed fan cooled motor enclosures. Motors located on air handling units shall be mounted in rubber supports or the fan shall be independently supported with spring isolators.
- B. Electrical characteristics shall be determined from Electrical Drawings and verified on the job from the electrical contractor.
- C. Motor starters shall be sized by the National Electric Code (NEC), and proper heater elements shall be provided and installed. Starters shall have overload trip element in each phase.

2.05 LABELING

- A. All electrical equipment and items consisting primarily of electrical components shall bear a label of an independent testing laboratory, such as Underwriters' Laboratory (UL).
- B. Where such testing and labeling service is available for other products, such as fire dampers, boilers, etc., the equipment shall bear such label.

PART 3 - EXECUTION

3.01 DESCRIPTION

- A. All work shall be performed by competent mechanics with a minimum of five years of experience. Mechanics are to use proper tools and equipment to produce first-quality work. All work shall be neatly installed, accessible for maintenance, and complete with all accessories required.

3.02 ACCESSIBILITY

- A. All equipment shall be installed in such a way that all components requiring access (such as drain pans, drains, fire dampers, control dampers, control operators, motors, drives etc.) are so located and installed that they may be serviced, reset, replaced or recalibrated, etc., by service people with normal service tools and equipment. If any equipment or components are shown in such a position that this contractor cannot comply with the above, the contractor shall notify the general contractor and attempt to resolve the problem of access. If this consultation is not successful, the architect and engineer shall be notified in writing and a decision requested.

3.03 WORK BY THIS CONTRACTOR

- A. Cutting, patching, furring, painting, electrical, plumbing, etc., shall be done by the affected trade at this contractor's expense for changes required in work already installed or work required by other trades for changes made by this contractor in type or size of equipment purchased. This contractor to remove cut or make access through existing panels and walls above ceiling as necessary to run new ductwork above ceiling.

3.04 WORK NOT INCLUDED

3.05 SPECIAL SUPPORTS

- A. Furnish and install all supports and special supports required for equipment installed under this Section.

3.06 NOISE AND VIBRATION

- A. Install vibration isolators, flexible connectors, expansion joints, and other safety measures to prevent noise and vibration from being transmitted to occupied areas. Equipment shall be selected to operate within the noise level recommended office work and its distance away from its location.

- B. Following installation, make proper adjustments to eliminate excessive noise and vibration.

3.07 PERMITS, CODES AND LAWS

- A. All work shall be in accordance with the following rules and regulations and any applicable laws.
 1. National Fire Protection Association (NFPA)
 2. Occupational Safety and Health Administration (OSHA)
 3. State Building Codes (SBC)
 4. Local Building Codes (LBC)
- B. Where any of the above is at variance with the drawings and specifications, the code requirements shall take precedence and any cost necessary to meet these shall be included in the contract.
- C. This contractor is assumed to be skilled in the trade and is solely responsible for compliance with OSHA regulations, performing the work in a safe and complete manner, and in installation procedures required for this work. All supervision assigned to this project shall be experienced in this type of work. This contractor's superintendent shall be designated as Safety Inspector, unless the contractor designated another person and notifies the engineer of this change.

3.08 REVIEW BY ENGINEER

- A. This contractor shall notify the engineer at the following stages of construction so that the engineer may visit the site for review and consultation:
 1. When demo starts
 2. When ductwork installation starts
 3. When coil work starts
 4. When equipment installation starts
 5. When ceiling installation will cover any work not reviewed
 6. When any lines or ducts are to be permanently concealed by construction
 7. When balancing and testing is started
- B. Should this contractor fail to notify the engineer at the times prescribed above, it shall then be his or her responsibility and cost to make ductwork accessible, expose any concealed lines or demonstrate the acceptability of any part of the system. Any extra cost, caused by the removal of work by other trades, shall be borne by this contractor.

3.09 EARLY STARTUP

- A. This contractor shall do all possible to see that the mechanical equipment is connected with electrical power as early as possible, so that final balancing and testing can be started. Should this contractor be ready for operation and power is not available, the general contractor and architect or engineer shall be notified.

3.10 CLEANING AND PAINTING

- A. Thoroughly clean all equipment and remove all trash, cartons, etc., from the area. Make any necessary corrections or repair/replace any damaged materials or equipment. Leave the entire system in a thoroughly clean and orderly manner.
- B. Any finished surface that have been scratched or discolored shall be touched up or repainted with paint to match the original color. If any part has been bent, broken or otherwise damaged, it shall be replaced prior to final review.
- C. All metal items inside the building subject to rusting, and all ferrous metal exposed to weather, shall be given one coat of rust preventive primer as soon as installed.

END OF SECTION

SECTION 230523
GENERAL-DUTY VALVES FOR HVAC PIPING

PART 2 PRODUCTS

1.01 APPLICATIONS

- A. See drawings for specific valve locations.
- B. Listed pipe sizes shown using nominal pipe sizes (NPS) and nominal diameter (DN).
- C. Provide the following valves for the applications if not indicated on drawings:

1.02 GENERAL REQUIREMENTS

- A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.
- B. Valve Sizes: Match upstream piping unless otherwise indicated.
- C. Valve Actuator Types:
- D. Valve-End Connections:
- E. General ASME Compliance:
 1. Building Services Piping Valves: ASME B31.9.

1.03 BRASS, BALL VALVES

- A. Two Piece, Full Port with Stainless Steel Trim and Female Thread, Male thread, or Solder Connections:
 1. Comply with MSS SP-110.
 2. SWP Rating: 150 psi.
 3. WOG Rating: 600 psi.
 4. Vacuum Rating: 28.9 in-Hg.
 5. Body: Forged brass.
 6. Seats: PTFE.
 7. Stem: Stainless Steel.
 8. Ball: Stainless Steel.
 9. Cap: Include cap-gasket and chain for 3/4 inch hose connection.
 10. Operator: Lockable handle and memory stop.

1.04 BRONZE, BALL VALVES

- A. General:
 1. Fabricate from dezincification resistant material.
 2. Copper alloys containing more than 15 percent zinc are not permitted.
- B. Two Piece, Full Port with Bronze or Brass Trim:
 1. Comply with MSS SP-110.
 2. WSP Rating: 150 psi.
 3. WOG Rating: 400 psi.
 4. Body: Forged bronze or dezincified-brass alloy.
 5. End Connections: Pipe thread or solder.
 6. Seats: PTFE.
 7. Stem: Stainless steel.
 8. Ball: Stainless Steel

1.05 BRASS, HORIZONTAL SWING CHECK VALVES

- A. Threaded End-Connections:
 1. Class 125: CWP Rating: 200 psi.
 2. Body: Forged brass.
 3. Disc: Forged brass.
 4. Hinge-Pin, Screw, and Cap: Forged brass.

- B. Press End-Connections:
 - 1. Class 125: WOG Rating: 200 psi.
 - 2. Body: Forged brass.
 - 3. Disc: Forged brass.
 - 4. Hinge-Pin, Screw, and Cap: Forged brass.

1.06 BRONZE, SWING CHECK VALVES

- A. Class 125:
 - 1. Pressure and Temperature Rating: MSS SP-80, Type 3.
 - 2. Design: Y-pattern, horizontal or vertical flow.
 - 3. WSP Rating: 200 psi.
 - 4. Body: Bronze, ASTM B62.
 - 5. End Connections: Threaded or soldered.
 - 6. Disc: Bronze.
 - 7. gasket seal

PART 3 EXECUTION

2.01 INSTALLATION

- A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.
- B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.
- C. Install check valves where necessary to maintain direction of flow as follows:
 - 1. Swing Check: Install horizontal maintaining hinge pin level.

END OF SECTION

SECTION 230529
HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SUBMITTALS

- A. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.

1.02 QUALITY ASSURANCE

- A. Comply with applicable building code.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of HVAC work.
 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
 3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of [____]. Include consideration for vibration, equipment operation, and shock loads where applicable.
 4. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
 5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
 - b. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - c. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
 1. Provide factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
 2. Comply with MFMA-4.
 3. Channel Material:
 - a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
 4. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch.
 5. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height.
- C. Channel Nuts:
 1. Provide carbon steel channel nut with epoxy copper or zinc finish and long, regular, or short spring.
- D. Hanger Rods:
 1. Threaded zinc-plated steel unless otherwise indicated.
 2. Minimum Size, Unless Otherwise Indicated or Required:
 - a. Equipment Supports: 1/2 inch diameter.
 - b. Piping up to 1 inch: 1/4 inch diameter.
 - c. Piping larger than 1 inch: 3/8 inch diameter.
 - d. Trapeze Support for Multiple Pipes: 3/8 inch diameter.
- E. Thermal Insulated Pipe Supports:
 1. General Requirements:

- a. Insulated pipe supports to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
 - b. Surface Burning Characteristics: Flame spread index/smoke developed index of 5/30, maximum, when tested in accordance with ASTM E84 or UL 723.
 - c. Pipe supports to be provided for nominally sized, 1/2 to 30 inch iron pipes.
 - d. Insulation inserts to consist of rigid polyisocyanurate (urethane) insulation surrounded by a 360 degree, PVC jacketing.
2. PVC Jacket:
- a. Pipe insulation protection shields to be provided with a ball bearing hinge and locking seam.
 - b. Minimum Service Temperature: Minus 40 degrees F.
 - c. Maximum Service Temperature: 180 degrees F.
 - d. Moisture Vapor Transmission: 0.0071 perm inch, when tested in accordance with ASTM E96/E96M.
 - e. Thickness: 60 mil.
 - f. Connections: Brush on welding adhesive.
3. Pipe insulation protection shields to be provided at the hanger points and guide locations on pipes requiring insulation as indicated on drawings.
- F. Pipe Supports:
1. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.
 2. Liquid Temperatures Up To 122 degrees F:
 - a. Overhead Support: MSS SP-58 Types 1, 3 through 12.
 - b. Support From Below: MSS SP-58 Types 35 through 38.
- G. Beam Clamps:
1. MSS SP-58 types 19 through 23, 25 or 27 through 30 based on required load.
 2. Beam C-Clamp: MSS SP-58 type 23, malleable iron and steel with plain, stainless steel, and zinc finish.
 3. Small or Junior Beam Clamp: MSS SP-58 type 19, malleable iron with plain finish. For inverted usage provide manufacturer listed size(s).
 4. Wide Mouth Beam Clamp: MSS SP-58 type 19, malleable iron with plain finish.
 5. Centerload Beam Clamp with Extension Piece: MSS SP-58 type 30, malleable iron with plain finish.
 6. FM (AG) and UL (DIR) Approved Beam Clamp: MSS SP-58 type 19, plain finish,
 7. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.
 8. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.
- H. Riser Clamps:
1. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.
 2. MSS SP-58 type 1 or 8, carbon steel or steel with epoxy plated, plain, stainless steel, or zinc plated finish.
 3. Medium Split Horizontal Pipe Clamp: MSS SP-58 type 4, carbon steel or stainless steel with epoxy plated, plain, stainless steel, or zinc plated finish.
 4. Copper Tube Pipe Clamp: MSS SP-58 type 8, epoxy plated copper.
 5. UL (DIR) listed: Pipe sizes 1/2 to 8 inch.
- I. U-Bolts:
1. MSS SP-58 Type 24, carbon steel u-bolt for pipe support or anchoring.
- J. Insulation Clamps:
1. Two bolt-type clamps designed for installation under insulation.
 2. Material: Carbon steel with epoxy copper or zinc finish.

- K. Pipe Hangers:
1. Hangers:
 - a. Provide hinged split ring and yoke roller hanger with epoxy copper or plain finish.
 - b. Material: ASTM A47/A47M malleable iron or ASTM A36/A36M carbon steel.
 - c. Provide hanger rod and nuts of the same type and material for a given pipe run.
 - d. Provide coated or plated hangers to isolate steel hangers from dissimilar metal tube or pipe.
 2. Swivel Ring Hangers, Adjustable:
 - a. MSS SP-58 Type 10, epoxy-painted, zinc-colored.
 - b. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.
 - c. FM (AG) and UL (DIR) listed for specific pipe size runs and loads.
 3. Clevis Hangers, Adjustable:
 - a. Copper Tube: MSS SP-58 Type 1, epoxy-plated copper.
- L. Pipe Shields for Insulated Piping:
1. General Construction and Requirements:
 - a. Surface Burning Characteristics: Comply with ASTM E84 or UL 723.
 - b. Shields Material: UV-resistant polypropylene with glass fill.
 - c. Maximum Insulated Pipe Outer Diameter: 12-5/8 inch.
 - d. Minimum Service Temperature: Minus 40 degrees F.
 - e. Maximum Service Temperature: 178 degrees F.
 - f. Pipe shields to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
- M. Anchors and Fasteners:
1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
 2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
 3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
 4. Hollow Masonry: Use toggle bolts.
 5. Hollow Stud Walls: Use toggle bolts.
 6. Steel: Use beam-ceiling clamps, beam clamps, machine bolts, or welded threaded studs.
 7. Beam Ceiling Flanges: ASTM A47/A47M Grade 32510, malleable iron or stainless steel with copper, plain, stainless steel, or zinc finish.
 8. Sheet Metal: Use sheet metal screws.
 9. Wood: Use wood screws.
 10. Plastic and lead anchors are not permitted.
 11. Powder-actuated fasteners are not permitted.
 12. Hammer-driven anchors and fasteners are not permitted.
 13. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
 - a. Comply with MFMA-4.
 - b. Channel Material: Use galvanized steel.
 - c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.

2.02 RETROFIT PIPING COVER SYSTEM

- A. General Requirements:
1. Surface Burning Characteristics: Flame spread index/smoke developed index of 20/250, maximum, when tested in accordance with ASTM E84 or UL 723.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.

- B. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.
- C. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- D. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- F. Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.
- G. Equipment Support and Attachment:
 - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 - 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

END OF SECTION

SECTION 230593
BALANCING AND TESTING OF AIR AND WATER SYSTEMS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. These Conditions add to, supplement, the GENERAL and SPECIAL CONDITIONS of the Contract Documents. The General and Special Conditions are part of this Section and shall apply as if written in full herein.

1.02 SCOPE

- A. This section specifies the requirements and procedures for total mechanical systems testing, adjusting, and balancing. Requirements include measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications, and recording and reporting the results.
- B. Test adjust and balance the following mechanical systems:
 1. Supply air systems
 2. Water systems
 3. Verify temperature control system operation

1.03 DEFINITIONS

- A. System testing, adjusting and balancing is the process of checking and adjusting all the building environmental systems to produce the design objectives. It includes:
 1. The balance of air distribution
 2. Adjustment of total system to provide design quantities
 3. Electrical measurement
 4. Verification of performance of all equipment and automatic controls
- B. Test: To determine quantitative performance of equipment
- C. Adjust: To regulate the specified fluid flow rate and air patterns at the terminal equipment (e.g. reduce fan speed, throttling).
- D. Balance: To proportion flows within the distribution system (submains, branches, and terminals) according to specified design quantities.
- E. Procedure: Standardized approach and execution of sequence of work operations to yield reproducible results.
- F. Report forms: Test data sheets arranged for the collecting test data in logical order for submission and review. These data should also form the permanent record to be used as the basis for required future testing, adjusting and balancing.
- G. Terminal: The point where the controlled fluid enters or leaves the distribution system. These are supply inlets on water terminals, supply outlets on air terminals, return outlets on water terminals and exhaust or return inlets on air terminals such as registers, grilles, diffusers, louvers, and hoods.
- H. Main: Duct or pipe containing the system's major or entire fluid flow.
- I. Submain: Duct or pipe containing part of the system's capacity and serving two or more branch mains.
- J. Branch main: Duct or pipe serving two or more terminals.
- K. Branch: Duct or pipe serving a single terminal.

1.04 SUBMITTALS

- A. Certified Reports: Submit testing, adjusting and balancing reports bearing the seal and signature of the Test and Balance Engineer. The reports shall be certified proof that the systems have been tested, adjusted and balanced in accordance with the referenced standards; are an accurate representation of how the systems have been installed; are a true representation of how the systems are operating at the completion of the testing, adjusting and

balancing procedures; and are an accurate record of all final quantities measured, to establish normal operating values of the systems. Follow the procedures and format specified below:

1. Final Reports: Upon verification and approval of draft reports, prepare final reports, type written, and organized and formatted as specified below. Submit 2 complete sets of final reports.
2. Report format: Report forms shall be those standard forms prepared by the Associated Air Balance Council (AABC) for each respective item and system to be tested, adjusted and balanced. Divide the contents in the binder into the listed divisions separated by divider tabs:
 - a. General information and Summary
 - b. Air systems
 - c. Water systems
 - d. Temperature control systems
3. Report contents: Provide the following minimum information, forms and data:
 - a. General Information and Summary: Inside cover sheet to identify testing, adjusting and balancing agency, contractor, owner, architect, engineer and project.
 - b. The remainder of the report shall contain the appropriate forms containing as a minimum, the information indicated on the standard report forms prepared by AABC and NEBB, for each respective item and system.

1.05 QUALITY ASSURANCE

- A. Test and Balance Engineer's Qualifications: Certification from either the Associated Air Balancing Council (AABC) or National Environmental Balancing Bureau (NEBB). Training to include at least 5 years of experience in testing, adjusting and balancing lab HVAC systems.

1.06 PROJECT CONDITIONS

- A. Systems Operation: Systems shall be fully operational prior to beginning procedures.

PART 2 - PRODUCTS

PART 3 - EXECUTION

3.01 RESPONSIBILITY FOR PROPER BALANCING AND TESTING

- A. The General Contractor is responsible for the performance of the entire building, including the work of this section. After this contractor has completed the installation, the superintendent for the general contractor shall monitor the Balancing and Testing of the system and shall certify that the readings required under this section have actually been made and that all systems are in actual operation. The Test and Balance data shall be signed by the general superintendent. At time of final review, if it is apparent that these readings have not been made, or that equipment is not in operation, the expense for the return of the engineer and/or architect shall be billed to the general contractor.

3.02 READING REQUIRED TO BE REPORTED

- A. The following readings shall be made and reported to the engineer after the building has been balanced and all equipment is operating properly. Each reading should have a date and time of day at which it was recorded. All air flows and water flows on drawings are to be measured and verified.
- B. Air quantity readings shall include:
 1. Actual measured air quantity
 2. Supply Fan, Return Fan air flows
 3. Verify all damper operations
- C. Temperature readings required as above:
 1. Outside air at equipment.
 2. Supply air leaving unit.
- D. Electrical readings required are:

1. Measured voltage and amps on EACH phase of each motor (compressor, fan, condenser fan(s), exhaust fans, pumps, etc.) while the equipment is under maximum normal load.
 2. The nameplate voltage and current for each of the above motors.
- E. Water readings required are:
1. Gpm water flows for each coil

3.03 READING REQUIRED TO BE REPORTED

- A. After the above information is received by the engineer, it will be reviewed and compared against the design. The engineer will generally review the job for the owner and recommend final acceptance or the holding of funds pending additional work. Such review will not be scheduled until the above information can be reviewed and accepted. The work required under this contract is not complete until this information is accepted as accurate and completes.

END OF SECTION

SECTION 237313
AIR HANDLING UNIT - INDOOR

PART 1: GENERAL

1.01 SECTION INCLUDES

- A. Air handling units.

1.02 REFERENCES

- A. AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
- B. AMCA 99 - Standards Handbook.
- C. AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes.
- D. AMCA 300 - Test Code for Sound Rating Air Moving Devices.
- E. AMCA 500 - Test Methods for Louver, Dampers, and Shutters.
- F. ARI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils.
- G. ARI 430 - Central-Station Air-Handling Units.
- H. ARI 435 - Application of Central-Station Air-Handling Units.
- I. ASTMB117 - Standard Practice for Operating Salt Spray Apparatus.
- J. NEMA MG1 - Motors and Generators.
- K. NFPA 70 - National Electrical Code.
- L. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- M. UL 723 - Test for Surface Burning Characteristics of Building Materials.
- N. UL 900 - Test Performance of Air Filter Units.
- O. UL 1995 - Standard for Heating and Cooling Equipment.
- P. UL 94 - Test for Flammability of Plastic Materials for Parts in Devices and Appliances.

1.03 SUBMITTALS

- A. Shop Drawings: Indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, and electrical characteristics and connection requirements. Computer generated fan curves for each air handling unit shall be submitted with specific design operating point noted. A computer generated psychometric chart shall be submitted for each cooling coil with design points and final operating point clearly noted.
- B. Product Data.
 - 1. Provide literature that indicates dimensions, weights, capacities, ratings, fan performance, gauges and finishes of materials, and electrical characteristics and connection requirements.
 - 2. Provide data of filter media, filter performance data, filter assembly, and filter frames.
 - 3. Manufacturer's Installation Instructions.

1.04 OPERATION AND MAINTENANCE DATA

- A. Maintenance Data: Include instructions for lubrication and filter, motor, and drive replacement.

1.05 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Air Handler products specified in this section must show a minimum five years documented experience and complete catalog data on total product.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site.
- B. Accept products on site on factory-installed shipping skids. Inspect for damage.

- C. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

PART 2: PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

2.02 THE FOLLOWING MANUFACTURERS ARE APPROVED FOR USE. NO SUBSTITUTIONS.

- A. Daikin Applied - 'Destiny' Air Handler is the basis of design, including standard product features and all special features required per plans and specifications.
- B. Enviro-Tech
- C. Greenheck

2.03 AIR HANDLER TYPE AND ARRANGEMENT

- A. The air handler shall be furnished as a horizontal draw-through cooling coil only type.

2.04 AIR HANDLER CASING

- A. Air handler casing shall be constructed with a corrosion resistant aluminum frame with 1" thick, double wall panels. Extruded aluminum frame and polymeric corner pieces are required for casing protection and rigidity. Unit panels shall consist of injected polyurethane foam insulation sandwiched between galvanized steel exterior and interior sheets. Formed "thermal break" panels shall have a plastic molded edge to eliminate inner and outer panels from contacting each other.
 - 1. Panels shall be fastened to frame with perimeter screws with a neoprene gasket in-between the panel and the frame to minimize air leakage and prevent thermal bridging from unit interior to unit exterior. Hinged and latched access panels for blower and filter sections shall be furnished on both the drive & opposite drive side to allow access to unit interior. Blower panel shall be furnished two, quarter-turn open-to-close, latch assemblies, one toolled flathead screw type and one with lever handle operation. Filter access panels shall be provided with hinges and two, quarter-turn open-to-close latch assemblies on the drive & opposite side only.

2.05 SUPPLY FAN

- A. The supply fan shall be a DWDI forward-curved type. Fan assemblies including fan, motor and sheaves shall be dynamically balanced by the manufacturer on all three planes at all bearing supports. Manufacturer must ensure maximum fan RPM is below the first critical speed.
- B. Fan and motor assembly shall be mounted on vibration type isolators inside cabinetry.

2.06 BEARINGS AND DRIVES

- A. Basic load rating computed in accordance with AFBMA - ANSI Standards, L-50 life at 200,000 hours heavy duty pillow block type, self-aligning, grease-lubricated ball bearings.
- B. Shafts shall be solid, hot rolled steel, ground and polished, keyed to shaft, and protectively coated with lubricating oil. Hollow shafts are not acceptable.
- C. V-Belt drives shall be cast iron or steel sheaves, dynamically balanced, bored to fit shafts and keyed. Variable and adjustable pitch sheaves selected so required RPM is obtained with sheaves set at mid-position and rated based on motor horsepower. Contractor to furnish fixed sheaves at final RPM as determined by balancing contractor.

2.07 ELECTRICAL

- A. Motor shall be a premium efficiency open drip-proof type. Electrical characteristics shall be as shown on the schedule.
- B. A junction box shall be furnished and mounted by fan manufacturer for field power connection to motor.

2.08 COOLING AND HEATING SECTIONS

- A. Access to coils from drive side [opposite connection side] of unit for service and cleaning shall be provided. Coil headers and return bends shall be fully enclosed within unit casing. Coil connections shall be factory sealed with grommet on exterior and gasket sleeve between outer wall and inner liner where each pipe extends through the unit casing to minimize air and condensate leakage.

2.09 COOLING COILS.

- A. Cooling performance shall be as specified on the unit schedule.
- B. Water coil fins shall have full drawn collars to provide a continuous surface cover over the entire tube for maximum heat transfer. Seamless copper tubes shall be mechanically expanded into the fins to provide a continuous primary-to-secondary compression bond over the entire finned length for maximum heat transfer rates. Bare copper tubes shall not be visible between fins. Coil casing shall be constructed of stainless steel.
- C. Water coils shall be provided with headers of seamless copper tubing with intruded tube holes to permit expansion and contraction without creating undue stress or strain. Coil connections shall be copper sweat connections with connection size to be determined by manufacturer based upon the most efficient coil circuiting. Vent and drain connections shall be furnished on the coil connection, external to the cabinet. Vent connections provided at the highest point to assure proper venting. Drain connections shall be provided at the lowest point.
- D. Drainpan shall be constructed from stainless steel, pitched and sloped in direction of airflow to drain connection to allow for condensate drainage. Drainpan shall be positioned above 1" thick insulated double wall panel. Condensate drain connections shall be provided on both sides of drain pan. Secondary drain connection shall be provided.
- E. Coil casing shall be constructed of Stainless steel.

2.10 FILTER SECTION

- A. Filter section shall be a 4-inch deep flat type furnished with MERV 14 deep pleated type filter.

2.11 FILTER MEDIA SHALL BE UL 900 LISTED, CLASS I OR CLASS II.

2.12 MIXING BOX

- A. Mixing box shall be constructed as described in section titled AIR HANDLER CASING. The mixing box return and outside air openings shall be located as specified on plans and schedule.
 - 1. The outside air mixing box dampers shall be constructed of airfoil design extruded aluminum blades and aluminum frame.
 - 2. The return air mixing box dampers shall be constructed of airfoil design extruded aluminum blades and aluminum frame.
 - 3. A damper actuator shall be furnished and mounted by others.
 - 4. A damper actuator shall be furnished and mounted by others.

PART 3: EXECUTION

3.01 INSTALLATION

- A. The air handler shall be installed per manufacturer's Installation & Maintenance instructions.

END OF SECTION

SECTION 237413
PACKAGED ROOFTOP HEAT AND COOL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

1.02 GENERAL DESCRIPTION

- A. This section includes the design, controls and installation requirements for packaged rooftop units / outdoor air handling units.

1.03 QUALITY ASSURANCE

- A. Packaged air-cooled condenser units shall be certified in accordance with ANSI/AHRI Standard 340/360 performance rating of commercial and industrial unitary air-conditioning and heat pump equipment.
- B. Packaged air-cooled condenser units shall be certified in accordance with ANSI/AHRI Standard 210/240 performance rating of commercial and industrial unitary air-conditioning and heat pump equipment.
- C. Unit shall be certified in accordance with UL Standard 1995/CSA C22.2 No. 236, Safety Standard for Heating and Cooling Equipment.
- D. Unit and refrigeration system shall comply with ASHRAE 15, Safety Standard for Mechanical Refrigeration.
- E. Unit shall be certified in accordance with ANSI Z21.47b/CSA 2.3b and ANSI Z83.8/CSA 2.6, Safety Standard Gas-Fired Furnaces.
- F. Unit Seasonal Energy Efficiency Ratio (SEER) shall be equal to or greater than prescribed by ASHRAE 90.1, Energy Efficient Design of New Buildings except Low-Rise Residential Buildings.
- G. Unit Energy Efficiency Ratio (EER) shall be equal to or greater than prescribed by ASHRAE 90.1, Energy Efficient Design of New Buildings except Low-Rise Residential Buildings.
- H. Unit shall be safety certified by ETL and ETL US listed. Unit nameplate shall include the ETL/ETL Canada label.

1.04 SUBMITTALS

- A. Product Data: Literature shall be provided that indicates dimensions, operating and shipping weights, capacities, ratings, fan performance, filter information, factory supplied accessories, electrical characteristics and connection requirements. Installation, Operation, and Maintenance manual with startup requirements shall be provided.
- B. Shop Drawings: Unit drawings shall be provided that indicate assembly, unit dimensions, construction details, clearances and connection details. Computer generated fan curves for each fan shall be submitted with specific design operation point noted. Wiring diagram shall be provided with details for both power and control systems and differentiate between factory installed and field installed wiring.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Unit shall be shipped with doors screwed shut and outside air hood closed to prevent damage during transport and thereafter while in storage awaiting installation.
- B. Follow Installation, Operation, and Maintenance manual instructions for rigging, moving, and unloading the unit at its final location.
- C. Unit shall be stored in a clean, dry place protected from construction traffic in accordance with the Installation, Operation, and Maintenance manual.

1.06 WARRANTY

- A. Manufacturer shall provide a limited "parts only" warranty for a period of 12 months from the date of equipment startup or 18 months from the date of original equipment shipment from the

factory, whichever is less. Warranty shall cover material and workmanship that prove defective, within the specified warranty period, provided manufacturer's written instructions for Installation, Operation, and maintenance have been followed. Warranty excludes parts associated with routine maintenance, such as belts and filters.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Products shall be provided by the following manufacturers:
 1. AAON
 2. Trane
 3. Daikin
 4. Substitute equipment may be considered for approval that includes at a minimum:
 - a. R-410A refrigerant
 - b. Variable capacity compressor with 10-100% capacity control
 - c. Direct drive supply fans
 - d. Double wall cabinet construction
 - e. Insulation with a minimum R-value of 13
 - f. Stainless steel drain pans

2.02 ROOFTOP UNITS

- A. General Description
 1. Packaged rooftop unit shall include compressors, evaporator coils, filters, supply fans, dampers, air-cooled condenser coils, condenser fans, gas heaters, exhaust fans, and unit controls.
 2. Unit shall be factory assembled and tested including leak testing of the DX coils, pressure testing of the refrigeration circuit, and run testing of the completed unit. Run test report shall be supplied with the unit in the service compartment's literature pocket.
 3. Unit shall have decals and tags to indicate lifting and rigging, service areas and caution areas for safety and to assist service personnel.
 4. Unit components shall be labeled, including refrigeration system components, and electrical and controls components.
 5. Estimated sound power levels (dB) shall be shown on the unit ratings sheet.
 6. Installation, Operation, and Maintenance manual shall be supplied within the unit.
 7. Laminated color-coded wiring diagram shall match factory installed wiring and shall be affixed to the interior of the control compartment's hinged access door.
 8. Unit nameplate shall be provided in two locations on the unit, affixed to the exterior of the unit and affixed to the interior of the control compartment's hinged access door.
- B. Construction
 1. All cabinet walls, access doors, and roof shall be fabricated of double wall, impact resistant, rigid polyurethane foam panels.
 2. Unit insulation shall have a minimum thermal resistance R-value of 13. Foam insulation shall have a minimum density of 2 pounds/cubic foot and shall be tested in accordance with ASTM D1929-11 for a minimum flash ignition temperature of 610°F.
 3. Unit construction shall be double wall with G90 galvanized steel on both sides and a thermal break. Double wall construction with a thermal break prevents moisture accumulation on the insulation, provides a cleanable interior, reduces heat transfer through the panel, and prevents exterior condensation on the panel.
 4. Unit shall be designed to reduce air leakage and infiltration through the cabinet. Cabinet leakage shall not exceed 1% of total airflow when tested at 3 times the minimum external static pressure provided in AHRI Standard 340/360. Panel deflection shall not exceed L/240 ratio at 125% of design static pressure, at a maximum 8 inches of positive or negative static pressure, to reduce air leakage. Deflection shall be measured at the midpoint of the panel height and width. Continuous sealing shall be included between

- panels and between access doors and openings to reduce air leakage. Piping and electrical conduit through cabinet panels shall include sealing to reduce air leakage.
- 5. Unit shall be designed to reduce air leakage and infiltration through the cabinet. Cabinet leakage shall not exceed 1% of total airflow when tested at 3 times the minimum external static pressure provided in AHRI Standard 210/240. Panel deflection shall not exceed L/240 ratio at 125% of design static pressure, at a maximum 8 inches of positive or negative static pressure, to reduce air leakage. Deflection shall be measured at the midpoint of the panel height and width. Continuous sealing shall be included between panels and between access doors and openings to reduce air leakage. Piping and electrical conduit through cabinet panels shall include sealing to reduce air leakage.
 - 6. Roof of the air tunnel shall be sloped to provide complete drainage. Cabinet shall have rain break overhangs above access doors.
 - 7. Access to filters, dampers, cooling coils, heaters, compressors, and electrical and controls components shall be through hinged access doors with quarter turn, zinc cast, lockable handles. Full length stainless steel piano hinges shall be included on the doors.
 - 8. Exterior paint finish shall be capable of withstanding at least 2,500 hours, with no visible corrosive effects, when tested in a salt spray and fog atmosphere in accordance with ASTM B 117-95 test procedure.
 - 9. Units with cooling coils shall include double sloped 304 stainless steel drain pans.
 - 10. Unit shall be provided with base discharge and return air openings. All openings through the base pan of the unit shall have upturned flanges of at least 1/2 inch in height around the opening.
 - 11. Unit shall include lifting lugs on the top of the unit.
 - 12. Unit base pan shall be provided with 1/2 inch thick foam insulation.
- C. Electrical
- 1. Unit shall have a 5kAIC SCCR.
 - 2. Unit shall be provided with factory installed and factory wired, non-fused disconnect switch.
 - 3. Unit shall be provided with factory installed and factory wired circuit breaker.
 - 4. Unit shall be provided with a factory installed and factory wired 115V, 12 amp GFI outlet disconnect switch in the unit control panel.
- D. Supply Fans
- 1. Unit shall include direct drive, un housed, backward curved, plenum supply fans.
 - 2. Blowers and motors shall be dynamically balanced and mounted on rubber isolators.
 - 3. Motors shall be premium efficiency ODP with ball bearings rated for 200,000 hours service with external lubrication points.
 - 4. Variable frequency drives shall be factory wired and mounted in the unit. Fan motors shall be premium efficiency.
- E. Exhaust Fans
- 1. Exhaust dampers shall be sized for 100% relief.
 - 2. Fans and motors shall be dynamically balanced.
 - 3. Unit shall include barometric relief dampers.
 - 4. Motors shall be premium efficiency ODP with ball bearings rated for 200,000 hours service with external lubrication points.
 - 5. Access to exhaust fans shall be through double wall, hinged access doors with quarter turn lockable handles.
 - 6. Unit shall include belt driven, forward curved exhaust fans.
 - 7. Variable frequency drives shall be factory wired and mounted in the unit. Fan motors shall be premium efficiency.
- F. Cooling Coils
- 1. Evaporator Coils

- a. Coils shall be designed for use with R-410A refrigerant and constructed of copper tubes with aluminum fins mechanically bonded to the tubes and galvanized steel end casings. Fin design shall be sine wave rippled.
- b. Coils shall be 6 row high capacity.
- c. Coils shall have interlaced circuitry and shall be 6 row high capacity.
- d. Coils shall be hydrogen or helium leak tested.
- e. Coils shall be furnished with factory installed expansion valves.

G. Refrigeration System

- 1. Unit shall be factory charged with R-410A refrigerant.
- 2. Compressors shall be scroll type with thermal overload protection and carry a 5 year non-prorated warranty, from the date of original equipment shipment from the factory.
- 3. Compressors shall be mounted in an isolated service compartment which can be accessed without affecting unit operation. Lockable hinged compressor access doors shall be fabricated of double wall, rigid polyurethane foam injected panels to prevent the transmission of noise outside the cabinet.
- 4. Compressors shall be isolated from the base pan with the compressor manufacturer's recommended rubber vibration isolators, to reduce any transmission of noise from the compressors into the building area.
- 5. Each refrigeration circuit shall be equipped with expansion valve type refrigerant flow control.
- 6. Each refrigeration circuit shall be equipped with automatic reset low pressure and manual reset high pressure refrigerant safety controls, Schrader type service fittings on both the high pressure and low pressure sides and a factory installed liquid line filter driers.
- 7. Unit shall include a variable capacity scroll compressor on the refrigeration circuit which shall be capable of modulation from 10-100% of its capacity.
- 8. Unit shall include a variable capacity scroll compressor on the lead refrigeration circuit which shall be capable of modulation from 10-100% of its capacity and an on/off compressor on the lag refrigeration circuit.
- 9. The factory installed controls shall include a 3 minute off delay timer to prevent compressor short cycling. The controls shall also include an adjustable, 20 second delay timer for each additional capacity stage to prevent multiple capacity stages from starting simultaneously and adjustable compressor lock out.

H. Condensers

- 1. Air-Cooled Condenser
 - a. Condenser fans shall be a vertical discharge, axial flow, direct drive fans.
 - b. Coils shall be designed for use with R-410A refrigerant. Coils shall be multi-pass and fabricated from aluminum microchannel tubes.
 - c. Coils shall be designed for a minimum of 10°F of refrigerant sub-cooling.
 - d. Coils shall be hydrogen or helium leak tested.
 - e. Condenser fans shall be high efficiency electrically commutated motor driven with factory installed head pressure control module. Condenser airflow shall continuously modulate based on head pressure and cooling operation shall be allowed down to 35°F with adjustable compressor lockout.

I. Gas Heating

- 1. Stainless steel heat exchanger furnace shall carry a 25 year non-prorated warranty, from the date of original equipment shipment from the factory.
- 2. Gas furnace shall consist of stainless steel heat exchangers with multiple concavities, an induced draft blower and an electronic pressure switch to lockout the gas valve until the combustion chamber is purged and combustion airflow is established.
- 3. Furnace shall include a gas ignition system consisting of an electronic igniter to a pilot system, which will be continuous when the heater is operating, but will shut off the pilot when heating is not required.

4. Unit shall include a single gas connection and have gas supply piping entrances in the unit base for through-the-curb gas piping and in the outside cabinet wall for across the roof gas piping.
 5. Modulating Natural Gas Furnace shall be equipped with modulating gas valves, adjustable speed combustion blowers, stainless steel tubular heat exchangers, and electronic controller. Combustion blowers and gas valves shall be capable of modulation. Electronic controller includes a factory wired, field installed supply air temperature sensor. Sensor shall be field installed in the supply air ductwork. Supply air temperature setpoint shall be adjustable on the electronic controller within the control compartment. Gas heater shall be capable of minimum turn down ratio of 3:1.
- J. Filters
1. Unit shall include 4 inch thick, pleated panel filters with an ASHRAE MERV rating of 13, upstream of the cooling coil. Unit shall also include 2 inch thick, pleated panel pre filters with an ASHRAE MERV rating of 8, upstream of the 4 inch standard filters.
 2. Unit shall include a clogged filter switch.
- K. Outside Air/Economizer
1. Unit shall include 0-100% economizer consisting of a motor operated outside air damper and return air damper assembly constructed of extruded aluminum, hollow core, airfoil blades with rubber edge seals and aluminum end seals. Damper blades shall be gear driven and designed to have no more than 20 cfm of leakage per sq ft. at 4 in. w.g. air pressure differential across the damper. Low leakage dampers shall be Class 2 AMCA certified, in accordance with AMCA Standard 511. Damper assembly shall be controlled by spring return enthalpy activated fully modulating actuator. Unit shall include outside air opening bird screen, outside air hood, and relief dampers.
 2. Economizer shall be furnished with return air CO₂ override.
- L. Controls
1. Factory Installed and Factory Provided Controller
 - a. Unit controller shall be capable of controlling all features and options of the unit. Controller shall be factory installed in the unit controls compartment and factory tested. Controller shall be capable of standalone operation with unit configuration, setpoint adjustment, sensor status viewing, unit alarm viewing, and occupancy scheduling available without dependence on a building management system.
 - b. Controller shall have an onboard clock and calendar functions that allow for occupancy scheduling.
 - c. Controller shall include non-volatile memory to retain all programmed values without the use of a battery, in the event of a power failure.
 - d. Variable Air Volume Controller
 - 1) Unit shall utilize a variable capacity compressor system and a variable speed supply fan system to modulate cooling and airflow as required to meet space temperature cooling loads and to save operating energy. Supply fan speed shall modulate based on supply air duct static pressure. Cooling capacity shall modulate based on supply air temperature.
 - 2) Unit shall modulate heating with constant airflow to meet space temperature heating loads. Modulating heating capacity shall modulate based on supply air temperature.
 - e. Constant Volume Controller
 - 1) Unit shall modulate cooling with constant airflow to meet space temperature cooling loads.
 - 2) Unit shall modulate heating with constant airflow to meet space temperature heating loads. Modulating heating capacity shall modulate based on supply air temperature.
 - f. Unit configuration, setpoint adjustment, sensor status viewing, unit alarm viewing, and occupancy scheduling shall be accomplished with connection to interface module with LCD screen and input keypad, interface module with touch screen, or with

connection to PC with free configuration software. Controller shall be capable of connection with other factory installed and factory provided unit controllers with individual unit configuration, setpoint adjustment, sensor status viewing, and occupancy scheduling available from a single unit. Connection between unit controllers shall be with a modular cable. Controller shall be capable of communicating and integrating with a LonWorks or BACnet network. [Orion Controls System]

M. Accessories

1. Unit shall be provided with a safety shutdown terminal block for field installation of a smoke detector which shuts off the unit's control circuit.

2.03 CURBS

- A. [Curbs shall to be fully gasketed between the curb top and unit bottom with the curb providing full perimeter support, cross structure support and air seal for the unit. Curb gasket shall be furnished within the control compartment of the rooftop unit to be mounted on the curb immediately before mounting of the rooftop unit.]
- B. [Knockdown curb (with duct support rails) shall be factory furnished for field assembly.]
- C. [Solid bottom curb shall be factory assembled and fully lined with curb rated 1 inch fiberglass insulation and include a wood nailing strip. (Curb shall be adjustable up to 3/4 inch per foot to allow for sloped roof applications.)]

PART 3 - EXECUTION

3.01 INSTALLATION, OPERATION, AND MAINTENANCE

- A. Installation, Operation, and Maintenance manual shall be supplied with the unit.
- B. Installing contractor shall install unit, including field installed components, in accordance with Installation, Operation, and Maintenance manual instructions.
- C. Start up and maintenance requirements shall be complied with to ensure safe and correct operation of the unit.

END OF SECTION

SECTION 237423
PACKAGED, OUTDOOR, HEATING ONLY MAKEUP AIR UNITS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. This Section includes indirect gas-fired heating or heating/make-up air units. Each unit shall be constructed in a horizontal configuration and shall incorporate additional product requirements as listed in the "PRODUCTS" section of this specification. If unit is intended for installation on a concrete slab, verify design requirements and construction responsibility for the slab.

1.02 SUBMITTALS

- A. All information in this document, as provided by Modine Manufacturing Company, is provided without representation or warranty of any kind as to the user or any other party, including, without limitation, ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE, OR NON-INFRINGEMENT. To the greatest extent permitted by applicable law, Modine Manufacturing Company assumes no liability, and the user assumes all liability and risk, for the use or results from the use of this document or the information contained herein, whether as modified by the user or not. This document must be carefully reviewed by the Engineer to ensure it meets the requirements of the project and local building code(s).
- B. As Modine Manufacturing Company has a Continuous Product Improvement program, it reserves the right to change design and specifications without notice.

1.03 QUALITY ASSURANCE

- A. The duct furnace(s) shall include ETL design certification for use in both the US and Canada to the ANSI Z83.8 - latest revision, standard for "Gas Unit Heater and Gas-Fired Duct Furnaces" for safe operation, construction, and performance.
- B. The complete system featuring duct furnace(s) and blower section (and cooling and downturn sections if applicable) shall include ETL certification to UL 1995/CSA C22.2 No. 236 "Heating and Cooling Equipment" and UL 795 "Commercial - Industrial Gas Heating Equipment" for electrical and mechanical safety.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years documented experience.

1.04 WARRANTY

- A. Standard Unit Warranty:
 1. Gas-Fired Heat Exchangers: One year from date of first beneficial use by buyer or any other user, within one year from date of resale by buyer in any unchanged condition, or within 18 months from date of shipment from seller, whichever occurs first.
 2. Coil Heat Exchangers, Sheet Metal: One year from date of first beneficial use by buyer or any other user, within one year from date of resale by buyer in any unchanged condition, or within 18 months from date of shipment from seller, whichever occurs first.
 3. All Other Parts: Two years from date of first beneficial use by buyer or any other user, within two years from date of resale by buyer in any unchanged condition, or within 30 months from date of shipment from seller, whichever occurs first.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Furnish and install an indirect gas-fired heating or heating/make-up air unit. Safety certified by ETL in accordance with UL Standard 1995/CSA C22.2 No. 236, Safety Standard for Heating and Cooling Equipment. Unit nameplate shall include the ETL/ETL Canada listed mark. Unit shall be fully assembled, charged, wired, and tested prior to shipment. If unit is intended for installation on a concrete slab, verify design requirements and construction responsibility for the slab.

2.02 MANUFACTURERS

- A. Modine model HDP
- B. Greenheck
- C. Trane

2.03 MECHANICAL CONFIGURATION

- A. Unit(s) shall have right side access, when looking into the discharge, and include:
 1. Furnace section(s) controls.
 2. Blower section containing a supply blower and motor with bottom support to provide rigidity. The blower connection shall be flexible with $\frac{1}{4}$ " gasket to prevent sound transmission into the supply ductwork.
 3. Electrical section isolated from the supply air stream including a hinged access door. Separate conduit entry points shall be provided for both high and low voltage electrical connections. Provisions must be included for side access electrical connections for slab mounted units and bottom electrical connections for roof curb mounted units.
 4. Downturn plenum section for downward deflection of the supply air.

2.04 CABINET

- A. Duct Furnace
 1. The duct furnace unit casing shall be constructed of not less than
 - a. 18 gauge aluminized steel and shall be painted with a baked-on gray-green polyester powder paint (7 mil thickness) for corrosion resistance.
 2. All duct furnace access side doors shall have heavy duty, draw tight, quarter turn latches.
- B. Blower Section
 1. The blower section shall be constructed of not less than 18 gauge aluminized steel and shall be painted with a baked-on gray-green polyester powder paint (7 mil thickness) for corrosion resistance.
 2. All blower section access side doors shall have heavy duty, draw tight, quarter turn latches.
 3. The blower cabinet shall be insulated as noted below.
- C. Downturn Plenum Section
 1. The downturn plenum section shall be constructed of not less than
 - a. 18 gauge aluminized steel and shall be painted with a baked-on gray-green polyester powder paint (7 mil thickness) for corrosion resistance.
 2. All downturn plenum section access side doors shall have heavy duty, draw tight, quarter turn latches.
 3. The downturn cabinet shall be insulated as noted below.
- D. Insulation
 1. Insulation shall be 1 inch, $1\frac{1}{2}$ lb density acoustical and thermal insulation. The insulation shall be made of glass fibers bonded with a thermosetting resin and overlaid with a fire-resistant black acrylic coating for additional strength. The acrylic coating must meet the requirements of ASTM C 665 for fungi resistance.
- E. Other Construction
 1. Roof shall be designed for maximum roof rigidity and prevention of standing water and perimeter drip edges to prevent water from dripping into the access doors.
 2. Unit shall be designed to reduce air leakage and infiltration through the cabinet. Continuous gasket sealing shall be included between panels and between access doors and openings to reduce air leakage.
 3. The unit shall be provided with a 14 gauge, galvanized steel mounting base with lifting and anchoring holes. The base is designed for either curb or slab mounting.
- F. Unit shall include an inlet hood with screen that shall be pre-assembled from the factory and provided with internal baffles to prevent water entrainment in the supply air stream.

2.05 AIR CONTROL CONFIGURATION

- A. Unit airflow control configuration shall be fresh and return air dampers.
 - 1. All fresh air dampers are ultra-low-leak with self-compensating stainless steel side seals and galvanized steel blades with edge seals. Dampers shall have a maximum Class I leakage resistance (less than 4 CFM/ft² at 1" W.C.) when tested in accordance with AMCA Standard No. 500, Test Methods for Louvers, Dampers, and Shutters.
 - 2. All return air balancing dampers are low-leak with galvanized steel blades. Dampers shall have a maximum Class III leakage resistance (less than 40 CFM/ft² at 1" W.C.) when tested in accordance with AMCA Standard No. 500, Test Methods for Louvers, Dampers, and Shutters.
- B. The damper actuator shall be mounted directly to the shaft of the fresh air damper. If return air dampers are provided, a damper linkage rod shall be provided to set the positions of the opposed dampers. As one damper opens, the opposing damper closes.
 - 1. The damper actuator shall be modulating, spring return so when power is disconnected, the damper closes the outside air opening.
 - 2. Damper controls shall be as outlined in the "CONTROLS" section.

2.06 HEATING SYSTEM

- A. The unit shall have an indirect fired gas heating section.
 - 1. The gas heat section shall consist of a single furnace.
 - 2. The venting shall be a power exhausted arrangement. The unit shall be tested to insure proper ignition when the unit is subjected to 40 mile per hour wind velocities.
 - 3. The gas heating section shall be configured for use with Natural Gas. The inlet gas pressure shall be 6-7" W.C. minimum, not to exceed 14" W.C.
 - 4. The thermal efficiency of the section shall be a minimum of 81% for all air flow ranges resulting in a temperature rise range of 60°F- 100°F.
 - 5. The heat exchanger(s) shall be made of 20 gauge 409 stainless steel tubes and headers. The flue collector box shall be made of 20 gauge aluminized steel.
 - 6. The burner(s) shall be made of the same material as the heat exchanger with a thickness of not less than 28 gauge. Burner(s) shall have non-clogging, slotted ports with a stainless steel separator strip designed for good lighting characteristics without noise of extinction. The burner(s) shall be located for service removal without disconnecting the main gas supply piping.
 - 7. Each heat exchanger tube shall be individually and directly flame- fired. The heat exchanger tube shall be contoured and dimpled to provide efficient heat transfer and crimped to allow for thermal expansion and contraction.
 - 8. The heat exchanger(s) seams and duct connections shall be certified to withstand 3.0" W.C. external static pressure without burner flame disturbance.
 - 9. The bottom of the unit shall be angled for draining any condensation to the corners of the unit. The condensation shall be removed through openings in the bottom pan.
 - 10. The drain pan shall be constructed of 20 gauge 409 stainless steel.
 - 11. The gas manifold(s) piping shall allow for gas piping connection on the side of the unit for slab mounted units and through the unit bottom for roof curb mounted units. The manifold(s) shall include a ground joint union for ease of servicing of the orifices without removing the burner assembly or main gas valve string.
 - 12. A 1/8" manifold pressure tap shall be located after all valves to test the manifold pressure directly before the main burner orifices.
 - 13. The orifices provided may include adjustable air shutters for controlling the primary air mixture.
 - 14. Orifices shall be sized for operation at 0-2000 feet elevation above sea level.
 - 15. The unit shall be provided with a single phase gas control transformer to step down the supply voltage to 24V.
 - 16. The ignition controller(s) shall be 100% shut-off with continuous retry for natural gas.

- 17. The solid state ignition system shall intermittently light the pilot each time the system is energized. Once the pilot is proven, the main gas valve shall open and allow gas flow to the main burner.
- 18. Each furnace shall include an automatic reset high limit switch.
- 19. The unit shall include an air flow proving switch to insure air flow across the heat exchanger before allowing the gas controls to be energized.
- 20. Each furnace shall include an optional low gas pressure switch(s) prevents the burner from firing if the inlet gas pressure is below the minimum gas pressure.
- 21. Each furnace shall include an optional high gas pressure switch(s) which prevents the burner from firing if the manifold gas pressure is above the maximum manifold gas pressure.
- B. The unit gas controls shall be provided with the following:
 - 1. An electronic modulating gas valve, combination gas valve, ignition control, and modulating control from the unit mounted microprocessor controller as described in the "Temperature Controls" section of "CONTROLS".
 - 2. The gas controls can modulate the capacity from 40 to 100% of full fire.

2.07 SUPPLY AIR BLOWER AND MOTOR

- A. The unit shall contain a single supply blower that is supported from the bottom to prevent the blower flanges supporting the weight of the motor. The blower shall be a double width, double inlet (DWI) forward curved, belt driven assembly.
 - 1. The blower shall have spider ball bearings.
 - 2. The blower assembly shall include motor and blower vibration isolation using rubber-in-shear grommets.
- B. The blower motor shall meet the following requirements:
 - 1. The motor type shall be Open Drip Proof (ODP).
 - 2. The motor shall be premium efficiency to meet the Energy Independence and Security Act requirements.
 - 3. The motor shall be rated for 208/60/3Ph supply voltage.
 - 4. The motor bearings shall be ball bearings rated for 200,000 hours. Motors not marked as having permanently lubricated bearings will include grease fittings for periodic lubrication.
 - 5. The motor wiring shall be in flexible metal BX conduit.
 - 6. The motor shall be provided with an adjustable motor sheave to allow for minor adjustment of the blower rpm at the job site.
 - 7. The motor shall be controlled by a motor starter with time delay relay.
 - 8. Supply air blower controls shall be as outlined in the "CONTROLS" section.

2.08 FILTERS

- A. Filter Rating: Filters shall be pleated disposable filters with a Minimum Efficiency Reporting Value of MERV 8 per ASHRAE standard 52.2.

2.09 ELECTRICAL

- A. The unit shall have an electrical control center where all high and low voltage connections are made.
 - 1. All electrical components shall carry UL, ETL, or CSA listing.
 - 2. The unit shall have a job specific wiring diagram affixed to the interior of the control compartment access door.
 - 3. Unit shall have single point power lugs to land the power feed conductors from a single power source.
 - 4. Separate line voltage and low voltage terminal strips shall be provided and all terminal blocks and wires shall be individually numbered.
 - 5. All electrical wires in the control panel shall be run in an enclosed raceway.
 - 6. A single step down transformer shall be provided for all unit controls.

- B. The unit shall be supplied with a factory installed non-fusible dead-front disconnect switch to disconnect power to the unit for servicing.
- C. The unit shall be supplied with a 115V GFCI service receptacle mounted in the blower compartment. This requires a separate 115V power supply.

2.10 CONTROLS

- A. The unit shall include a Carel programmable microprocessor controller mounted in a controls compartment outside the airstream. The controller will be programmed with the Modine Controls System(TM) to operate the unit in an energy efficient manner using pre-engineered control strategies. The controller will monitor output from sensors within each unit subsystem and automatically adjust unit operating parameters to maintain programmed setpoints and strategies.
 - 1. The control system shall contain LED's and/or LCD interface to indicate the power status, communications status, and fault conditions that arise during operation. Fault conditions indicated include but are not limited to supply air sensor failure, outdoor air sensor failure, space sensor failure, mechanical cooling failure, mechanical heating failure, low supply temperature alarm, high supply temperature alarm, and control temperature cooling or heating failure. The controller shall also monitor outside temperature for heating and cooling circuit lockout during mild conditions. If temperatures fall below the low supply temp alarm point, the unit shall be shut down.
 - 2. The Carel controller shall be capable of independent stand-alone operation with field configuration, setpoint adjustment, and scheduling accomplished at the unit with an integral user interface that includes a backlit LCD display, keypad, and status LEDs to allow the programming of the control parameters (set point, differential band, alarm thresholds) and basic functions by the user (ON/OFF and display of the controlled values).
 - 3. The unit shall be provided with a Carel space mounted digital module, model pAD, which includes a temperature sensor and backlit LCD display to review unit setpoints and unit output and operating conditions. The pAD module does not allow remote programming of the control parameters, but does allow temporary override of the unit. The device shall be field wired to the main unit controller via the Carel pLAN network using shielded cable by others.
 - 4. Remote Control User Interface: The unit shall be provided with a Carel model pDG1 hand-held user interface for the factory Microprocessor Controller. The device features a backlit LCD display and keyboard that displays status of controllers inputs and outputs, allows for unoccupied/occupied set-point changes, displays service settings, allows adjustment of control parameters, and is used for troubleshooting the unit. The device shall be field wired to the unit microprocessor controller via the Carel pLAN network using shielded cable by others.
 - 5. The controller shall have a full calendar schedule for occupied, unoccupied, and holiday scheduling.
 - 6. The controller shall retain all programmed values in non-volatile memory in the event of a power failure.
 - 7. The Carel controller shall include a pCONet interface to provide the ability to communicate and integrate with BACNet® MS/TP communication networks.
- B. Damper Controls: The damper controls subsystem shall be controlled by the microprocessor controller as follows:
 - 1. The damper control shall provide dry bulb economizer control and will modulate from the scheduled minimum % outside air, up to 100% OA, to maintain a mixed air temperature (typical 55°F, adjustable) to minimize load on the heating or cooling system. The fresh air damper closes and the return air opens when the unit is unoccupied or off.
- C. Supply Fan Controls: The supply fan controls subsystem shall be controlled by the microprocessor controller as follows:
 - 1. The supply fan shall be single speed, on/off control with factory installed motor starter.

- D. Temperature Controls: The temperature controls subsystem shall be controlled by the microprocessor controller as follows:
 - 1. Supply Air Temperature Control with Space and Outside Temperature Reset – The Carel controller shall monitor and control the supply air temperature to maintain the desired setpoint. Additional space and outside air temperature sensors are used and if the temperature does not meet the programmed setpoint for either of those sensors, the supply air temperature setpoint is lowered to increase cooling or raised to increase heating.
 - 2. The microprocessor controller shall monitor the following sensors to achieve the control strategy described above:
 - a. An outside air temperature only sensor shall be shipped loose for field installation in the outdoor environment.
 - b. A supply air temperature only sensor shall be shipped loose for field installation in the supply air ductwork, downstream from the unit discharge to ensure sensing of properly mixed airflow.
 - c. A return air temperature only sensor shall be shipped loose for field installation in the return air ductwork.
- E. Other Optional Controls: The unit shall be provided with the following additional controls:
 - 1. Unit External Enable Relay: The unit shall be provided with a relay wired to a digital input on the unit microprocessor controller that starts the unit in Occupied mode based on contact closure from an external control device by others.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Prior to start of installation, examine area and conditions to verify correct location for compliance with installation tolerances and other conditions affecting unit performance. See unit Installation & Service Manual.
- B. Examine roughing-in of plumbing, electrical and HVAC services to verify actual location and compliance with unit requirements. See unit Installation & Service Manual.
- C. Proceed with installation only after all unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Installation shall be accomplished in accordance with these written specifications, project drawings, manufacturer's installation instructions as documented in manufacturer's Installation & Service Manual, Best Practices and all applicable building codes.

3.03 CONNECTIONS

- A. In all cases, industry Best Practices shall be incorporated. Connections are to be made subject to the installation requirements shown above.
- B. Piping installation requirements are specified in Division 22 (Plumbing). Drawings indicate general arrangement of piping, fittings and specialties.
- C. Duct installation and connection requirements are specified in Division 23 (Heating Ventilating and Air Conditioning).
- D. Electrical installation requirements are specified in Division 26 (Electrical).

3.04 FIELD QUALITY CONTROL

- A. Refer to section 01 40 00 "Quality Requirements" for additional requirements.

3.05 SYSTEM STARTUP

- A. Start-up units in accordance with manufacturer's start-up instructions. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.

END OF SECTION